AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

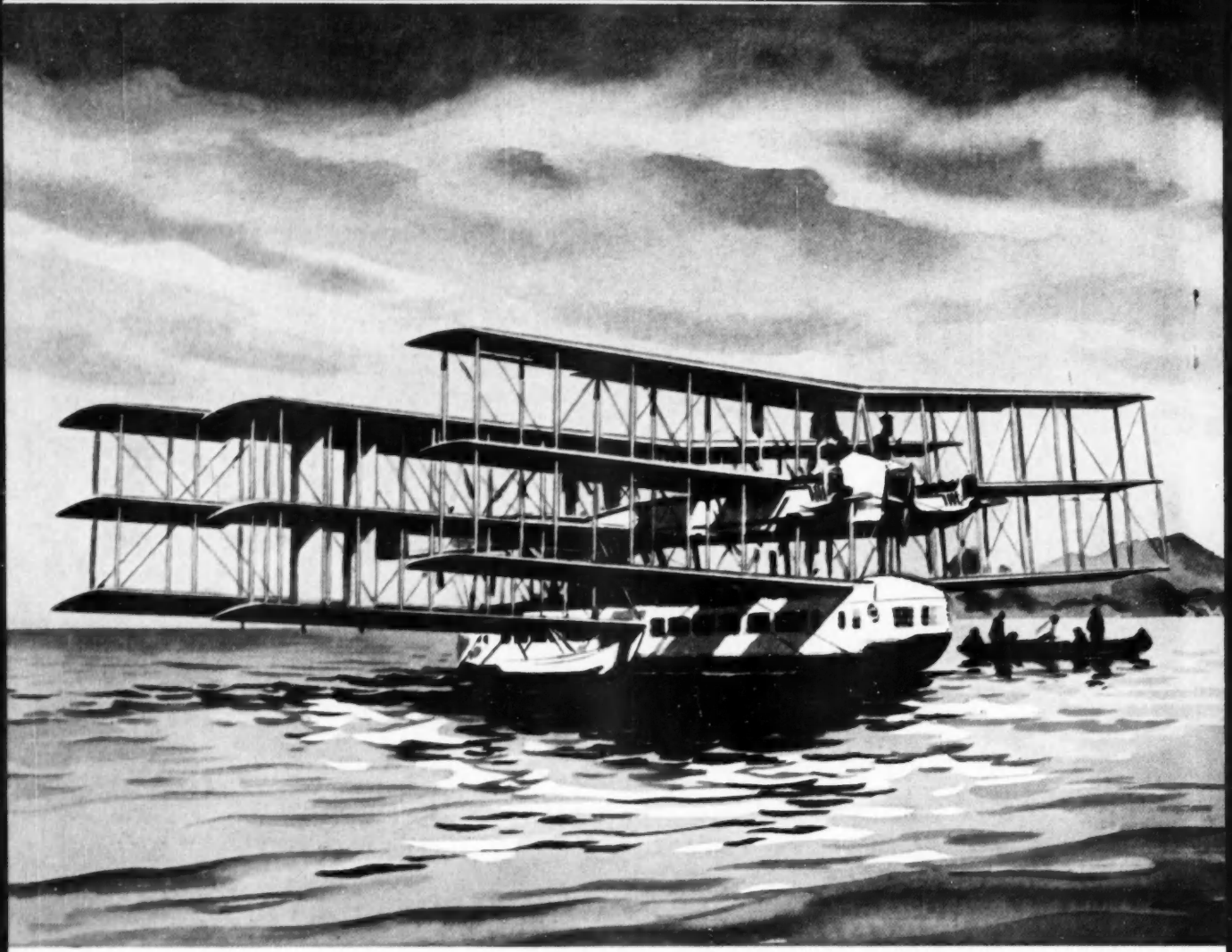
SEPTEMBER 15, 1954

In This Issue

Small Engine Program of the Armed Forces
Special Power Train for Tractor Shovel
Russia's Automotive Production Facilities
Torsion Bar Suspension for Passenger Cars
Evaluation of Lancia V-6 Aluminum Engine
Diesel Engines in European Passenger Cars

COMPLETE TABLE OF CONTENTS, PAGE 3

A CHILTON PUBLICATION



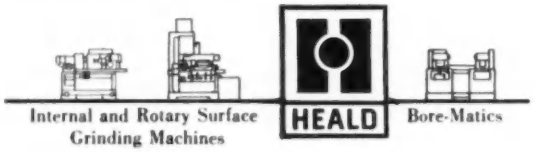
This one looked great . . . on paper

For all its nine wings and eight engines, the 25-ton "Epocha," built over 30 years ago by the Caproni Brothers, never got off the water. It *might have*—but it was destroyed by fire before the first test flight. Success or failure? The world will never know. Yet multiple wing types, favored by many early designers, are just memories now—left far behind in the competitive struggle for existence.

Competition is a mighty strong force today. Because of it, manufacturers everywhere are seeking new ways of improving product quality and cutting manufacturing cost. That's where we come in. For precision finishing on Heald machines can often make substantial savings in production time—help build a better, longer-lasting product, too.

Your Heald precision finishing specialist will be glad to show you how the latest developments in automation, way-type and transfer Bore-Matics, new grinding methods and interchangeable tooling can be applied to advantage on your production line.

Competition is wonderful if you're *ahead* of it. Our business is to help keep you there. That's why It Pays to Come to Heald.



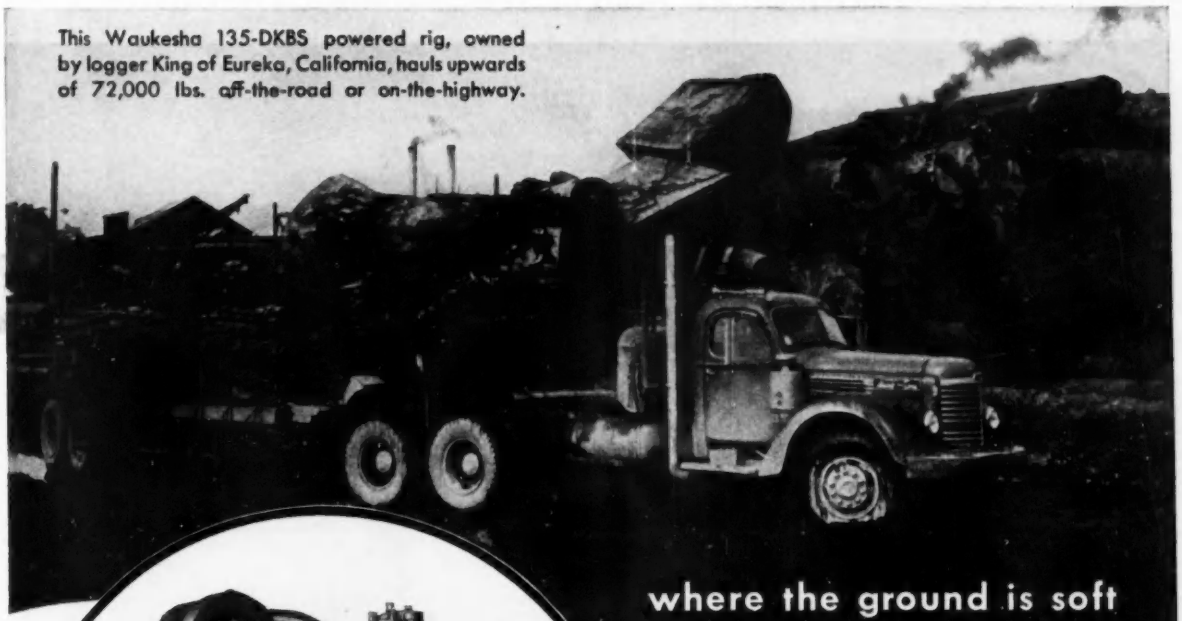
Internal and Rotary Surface Grinding Machines

Bore-Matics

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Offices in Chicago • Cleveland • Dayton
Detroit • Indianapolis • New York



This Waukesha 135-DKBS powered rig, owned by logger King of Eureka, California, hauls upwards of 72,000 lbs. off-the-road or on-the-highway.

where the ground is soft
and the hauling is hard...
it's the PAYLOAD
POWER PLANT



turbocharged WAUKESHA Diesels

135-DKBS Turbocharged DIESEL

Six cylinders
4¼-in. x 5-in.
426 cu. in. displ.
Max. hp. 185
at 2800 rpm.

For greater power at lowest fuel cost—the Waukesha Turbo-supercharged 135-DKBS! It is a compact, powerful, heavy-duty, six-cylinder, four-cycle, full Diesel. The patented combustion chambers burn all standard "high-speed Diesel fuels" having cetane values of 45 or above. This powerful supercharged Diesel offers lively acceleration, clean burning, prompt starting, a tremendous reserve of power, and great overall economy.

The exhaust turbocharger system of supercharging affords a great increase in horsepower with a minimum of parasite load. Even without an intercooler the maximum power available from the Model 135-DKB Diesel Engine is increased from 147 hp. to 185 hp. at 2800 rpm. Without positive drive from the engine, the parasitic load decreases at part engine load, which improves overall fuel economy throughout the speed range.

Other advantages of the exhaust turbocharger are a relatively light and compact installation, flexibility in mounting, and the smoothing out of the exhaust impulses by the turbocharger turbine. Contributing to the Waukesha turbocharged Diesel's complete reliability and long-lived, trouble-free operation are time-tested and war-proved features developed in over 45 years of study and experience in building heavy-duty industrial-type internal combustion engines.

Send for descriptive Bulletin 1617.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

NEW YORK • TULSA • LOS ANGELES

246


MATTISON
Here is a Mattison three head Vertical Spindle Rotary Automatic Grinder at the Ford Cincinatti Automatic Transmission Plant, finishing converter housings to close limits of accuracy on a real production basis. Work pieces are held in automatic clamping fixtures. Automatic sizers are constantly in operation, checking the work and keeping all pieces within specified tolerances without operators attention.
This is only one of the many grinders made by Mattisons. Whatever your surface grinding problem may be, write us for our recomendation on the proper method and machine for your job.
MATTISON
MACHINE WORKS
ROCKFORD · ILLINOIS

A CHILTON MAGAZINE

AI AUTOMOTIVE INDUSTRIES

PUBLISHED SEMI-MONTHLY

SEPTEMBER 15, 1954 VOL. III, NO. 6

EDITORIAL STAFF

James R. Custer, Editor
H. H. Roberts, Engineering Editor
Thomas Mac New, Market Research Editor
Paul C. Kennedy, Machinery Editor
Andrew Shearer, News Editor
Robert P. Homer, Art Editor
Marcus Ainsworth, Statistical Editor
Howard Kohlbrenner, Art Director

DETROIT
Joseph Geschelin, Detroit Editor
Leonard Westrate, News Editor, Detroit
Edward Janicki, Associate Editor, Detroit

LOS ANGELES
R. Raymond Kay, Pacific Coast Editor

WASHINGTON
George H. Baker, Washington Editor
Ray M. Stroupe, Washington News Ed.
Neil R. Regeimbal, Washington News Ed.

PARIS
W. F. Bradley, European Correspondent

Paul Wooton, Washington Member, Editorial Board

As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by International News Service and has editorial correspondents in major United States and foreign industrial centers.

FEATURES

How Small Engines Are Standardized for the Armed Forces. By R. W. Beal and R. F. Dennis 48
Tractor Shovel Has Special Transmission 52
Special Device for Ball Joint Suspensions 55
Automotive Industry and Russian Mobilization 56
Prospects for Torsion Bar Suspension on American Passenger Cars. By Joseph Geschelin 64
Diesels in European Cars. By W. F. Bradley 66
Precision Shaping Panoramic Windshield Glass 69
An Evaluation of a V-6 Aluminum Engine. By John R. Long and Donald H. Perry 70
Six-Stroke Engine Tested in Switzerland 92
Floating-Hub Wheel 92
AMA Report On Air Pollution Given at SAE West Coast Meeting. By R. Raymond Kay 100
Brazilian Truck Factories. By L. M. Peppercorn, Jr. 180

NEWS PREVIEWS

Automobile Workers Win Cent-an-Hour Increase 33
Packard Starts Moving Into Connor Ave. Plant 33
GM Baffled By Proposed Tax Refund 33
Lockheed to Build New Model of Constellation 34
U. S. Orders War Plants Kept on Standby Basis 34
GM of Canada Nearing End of Expansion Program 35
Future of Kaiser Motors Remains Uncertain 35
Merger Talks Off Between Mack and White 36
"Big Four" Seen in Car Industry in Two Years 36
Willys Dowagiac Plant Goes on Auction Soon 37
Transmission Work Starts at Ford Livonia Plant 38
Agreement at Pressed Metals Brings New Hope 38
Fairchild and Fokker to Build Turboprop Plane 39
Kaiser Union Given Franchise to Sell Cars 39
Hydraulic Press Studies Offer to Buy Company 40

DEPARTMENTS

High Spots of This Issue 31
News of the Automotive and Aviation Industries 33
Men in the News 41
Machinery News. By Thomas Mac New 79
New Plant and Production Equipment 80
New Products 88
Free Literature and Free Information Service 89
New Products for Aircraft 94
The Business Pulse 96
Airbriefs. By Robert McLarren 98
Calendar of Coming Events 118
Shorties 140
On Our Washington Wire 152
More Defense Contract Awards 154
New Defense Facilities 168

Business Department Staff 31
Chilton Officers and Directors 31
Advertisers' Index 252

Copyright 1954 by Chilton Company (Inc.)

MEMBER
National Business Publications, Inc.
Society of Business Magazine Editors
Audit Bureau of Circulations

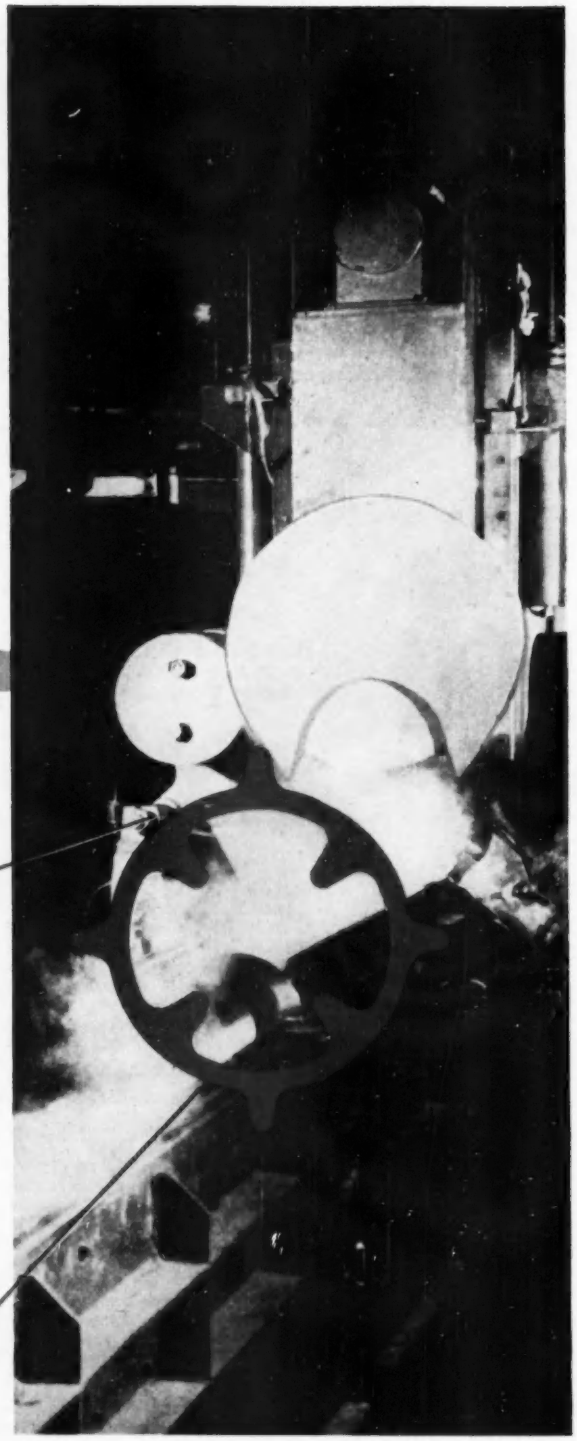
AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, United States Possessions, 1 year $2.00, 2 years $3.00. Canadian and Foreign, 1 year $5.00, 2 years $8.00; single copies, 25 cents, except Statistical Issue (Mar. 15th), $1.00

let us take a closer look at your

"difficult to solve" problems involving tubing and solids of special alloys and cross-sections



Two years of experimental production and several thousand tons of finished extruded products have given B&W a background that can be put to work for you in solving problems involving tubing and solids of special alloys and cross-sections. Through extrusion at B&W:

1. **New alloys have become commercially available as seamless tubing.** These include certain proprietary alloys and various types of ferrous alloys which have been known previously as non-pierceable materials.
2. **Tubing having certain special shaped cross-sections has been produced commercially.** This includes tubing having inside and outside shapes which are independent of each other, such as circular OD-finned ID, used to solve special heat transfer problems.
3. **Solids having special shaped cross-sections have been produced.** These include shapes difficult or impossible to produce as rolled sections.

Through extrusion, Mr. Tubes, your local B&W Tubing Representative, has helped others to solve problems involving tubing and solids of special materials and cross-sections. Call on him if you have such problems; chances are he will be able to help you.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

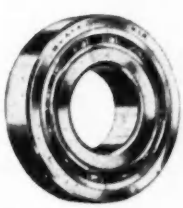
B&W SEAMLESS and WELDED TUBES

TA-4032(X)



Gas-Turbine-Powered Pump on Test at Navy Fire Fighting School

Where Hyatts turn at 40,000 rpm!



Old in theory, gas turbines are comparatively new as a practical power source. So it was big news in engine development when Solar Aircraft Company, of California, announced the world's first portable, hand-started gas turbine power plant.

Developing 50 horsepower, the new lightweight operates at the high speed of 40,000 rpm—or twenty times the speed of most automobile engines! And that's where *we* come in.

To be sure of complete bearing dependability for such high-speed operation, Solar turned to Hyatt . . . and there's a Hyatt Hy-Load Roller Bearing at the most critical position on the turbine shaft.

Whether you're building locomotives or lawn mowers, and whether shafts turn at 4 or 40,000 rpm, you'll get better bearing performance from *Hyatts!*

HYATT ROLLER BEARINGS

STRAIGHT ○ BARREL ○ TAPER ○

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

THESE 3 SUN GREASES WILL DO 95% OF YOUR GREASE LUBRICATION JOBS

—save you the cost and trouble of stocking a large number of "special purpose" greases



FIBROUS • Sun Grease 844X

Has exceptional oxidation stability under high temperature conditions. Recommended for all antifriction bearings. A general-purpose, high melting point lubricant for pressure gun and grease cup application.

BUTTERY • Sun Grease 300A

Especially designed for pressure lubrication of bearings operated at normal speeds and temperatures. Can be used in pressure guns, compression grease cups, or pressure lubrication systems. Has high water resistance and excellent pumpability at low temperatures.





TACKY • Sun Grease 897

For open gears, chains, slides, cams, linkages and bearings. Used whenever "throw-off" must be avoided. High adhesive and cohesive characteristics. An excellent lubricant that is water resistant and does not need frequent application.

Of the 81 different Sun greases, these three can fill the vast majority of your needs. And lubrication simplification like this means worth-while economies for you in several directions. You can reduce the total amount of money you need to "invest" in lubricants. You can greatly lighten the housekeeping job of storing and handling your greases. And you can reduce the confusion and risk of error often created when personnel are required to choose from a large number of greases.

For lubrication points that do require special kinds, Sun offers a total of 78 other greases with a wide range of properties and characteristics.

Find out just how much you can economize by using Sun lubricants. Call in your Sun representative. Or write for information. Dept. AA-9.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline



Auto-Lite is world famous for long life, performance and economy

Around the world, more than 400 products of Auto-Lite are used day and night in cars, trucks, planes, boats and industry . . . convincing proof of the outstanding quality made possible by Auto-Lite advanced engineering and precision manufacturing. So to get the best in long life, in power and performance and in economy, it pays to insist on world famous Auto-Lite products.

Manufacturers of BATTERIES • BUMPERS • FUEL PUMPS • HORNS • GENERATORS • LIGHTING UNITS SPEEDOMETERS • SPEEDOMETER CABLE • SWITCHES • STARTING MOTORS INSTRUMENTS & GAUGES • IGNITION UNITS • MOULDED PLASTICS WINDSHIELD WIPERS • WINDOW LIFTS • SEAT MOVING MECHANISMS • HUB CAPS WIRE & CABLE • SPARK PLUGS • METAL FABRICATED ASSEMBLIES • GRAY IRON CASTINGS • ZINC & ALUMINUM BASE DIE CASTINGS

THE ELECTRIC AUTO-LITE COMPANY • TOLEDO 1, OHIO

Another Duplex Milling Machine

BY MOTCH & MERRYWEATHER

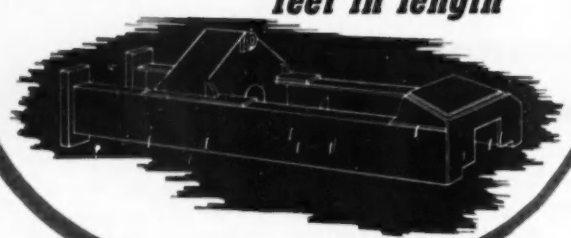
Fifty Years 1904 • 1954

STANDARDIZED TRAVELING HEAD DESIGN is adapted to *Many Specialized Jobs*



A Motch & Merryweather Duplex Milling Machine finishes the pads of an 8-foot tractor frame. A second frame (rear) is loaded while the first frame (front) is milled.

... especially for Large Parts 6 feet to 11 feet in length



Again using the facility of *traveling milling heads* instead of traveling fixtures, Motch & Merryweather creates greater universality; saves time, original cost and floor space. Standardized design enables duplex operation to dispatch a wide range of work with money-making speed and accuracy. Simplified fixturing is readily adjustable to handle parts of varying size. May we study your requirements?

THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

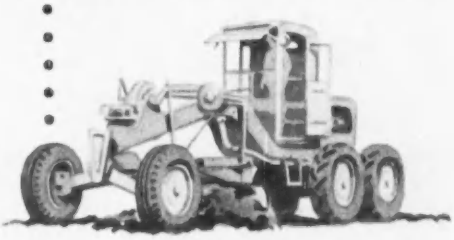
CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, also Production Milling, Turning, and Special Machines

Ross STEERS THEM ALL



TRUCKS



ROAD GRADERS



BUSES AND TROLLEY COACHES



PASSENGER CARS

Exclusive steering specialists since 1906, Ross supplies the *right* gear for every steering need—*manual* or *power*.

Ross Cam & Lever manual steering has long been noted for maximum *ease* and *stability* in just the *right* combination . . . sturdy, rugged construction . . . minimum wear . . . simplicity and speed in any needed adjustment.

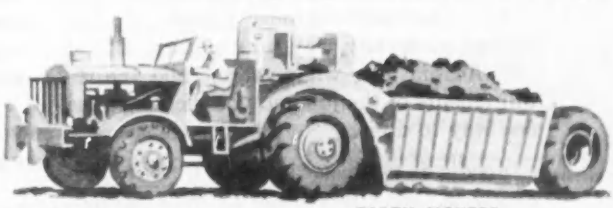
Active in power steering since 1942, Ross is currently producing—for a wide variety of vehicles—both *integral* and *linkage* types that are among the *simplest*, *surest*, most *economical* power units yet developed.

We invite discussion of *any* steering problem.

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

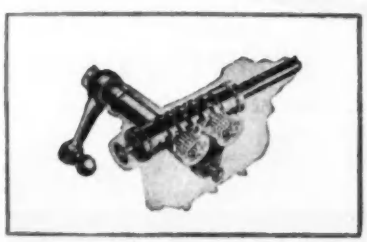


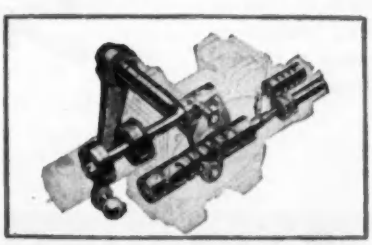
TRACTORS

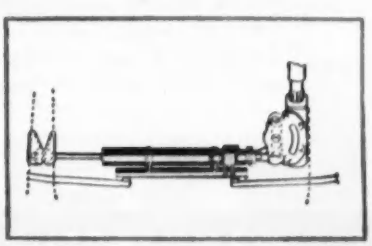


EARTH MOVERS

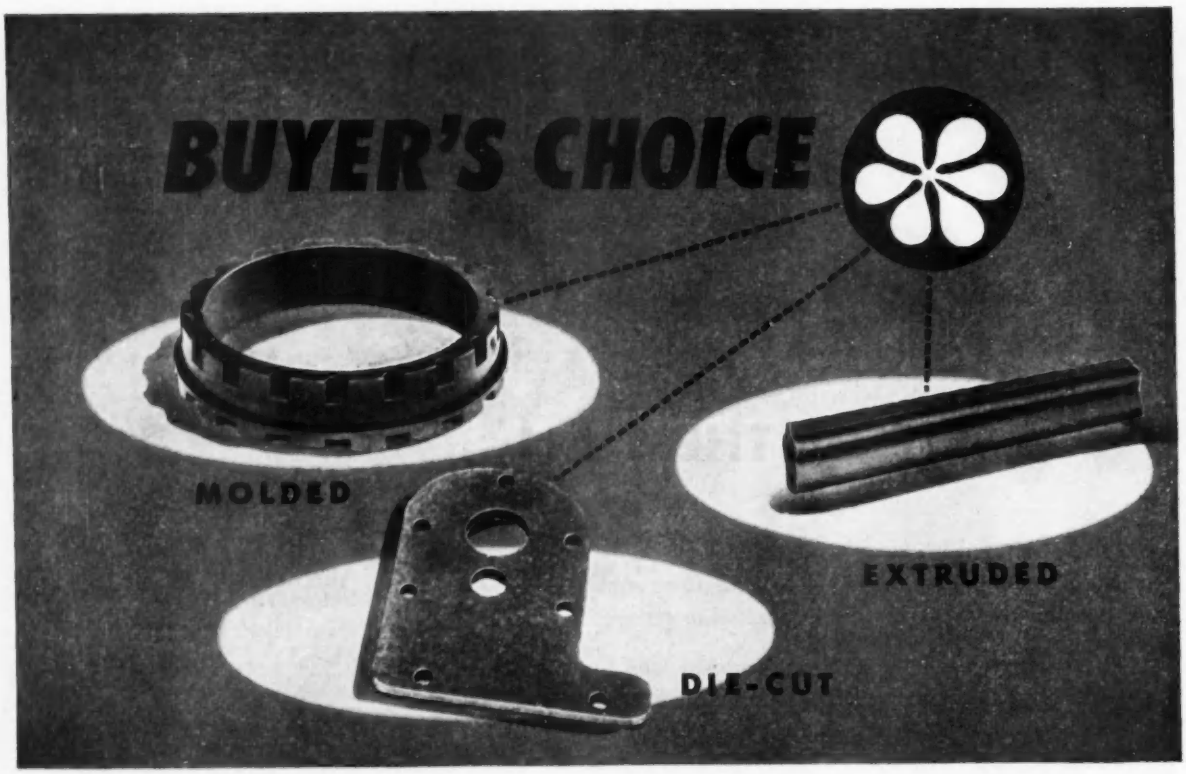
A GEAR FOR EVERY NEED







CAM & LEVER MANUAL...HYDRAPOWER INTEGRAL...HYDRAPOWER LINKAGE



*ACADIA SYNTHETIC RUBBER PARTS ARE MADE ALL 3 WAYS!

With Acadia you have a *choice!* Not only molded rubber . . . not only molded and die-cut . . . not only extruded rubber . . . but rubber parts any way you require! Better yet, Acadia uses whatever method the requirements of the job and you dictate is the *best* way to do it.

Acadia is especially sensitive to your specifications. We will process synthetic components for oil-resistance—good aging properties—resistance to heat—any characteristic you're seeking, or a combination of characteristics. Acadia parts are cut, molded or extruded to all required shapes, sizes and types, with almost unlimited applications.

Also, we offer Acadia SILICONE Rubber, molded or extruded for gaskets, seals, "O" rings, washers, sheets, cut-parts and packings. This is the rubber that will stay resilient at 100° *below* zero, or 500° above!

There's an Acadia Sales Engineer near you to serve you. Write us today, and we'll put him in touch with you immediately.

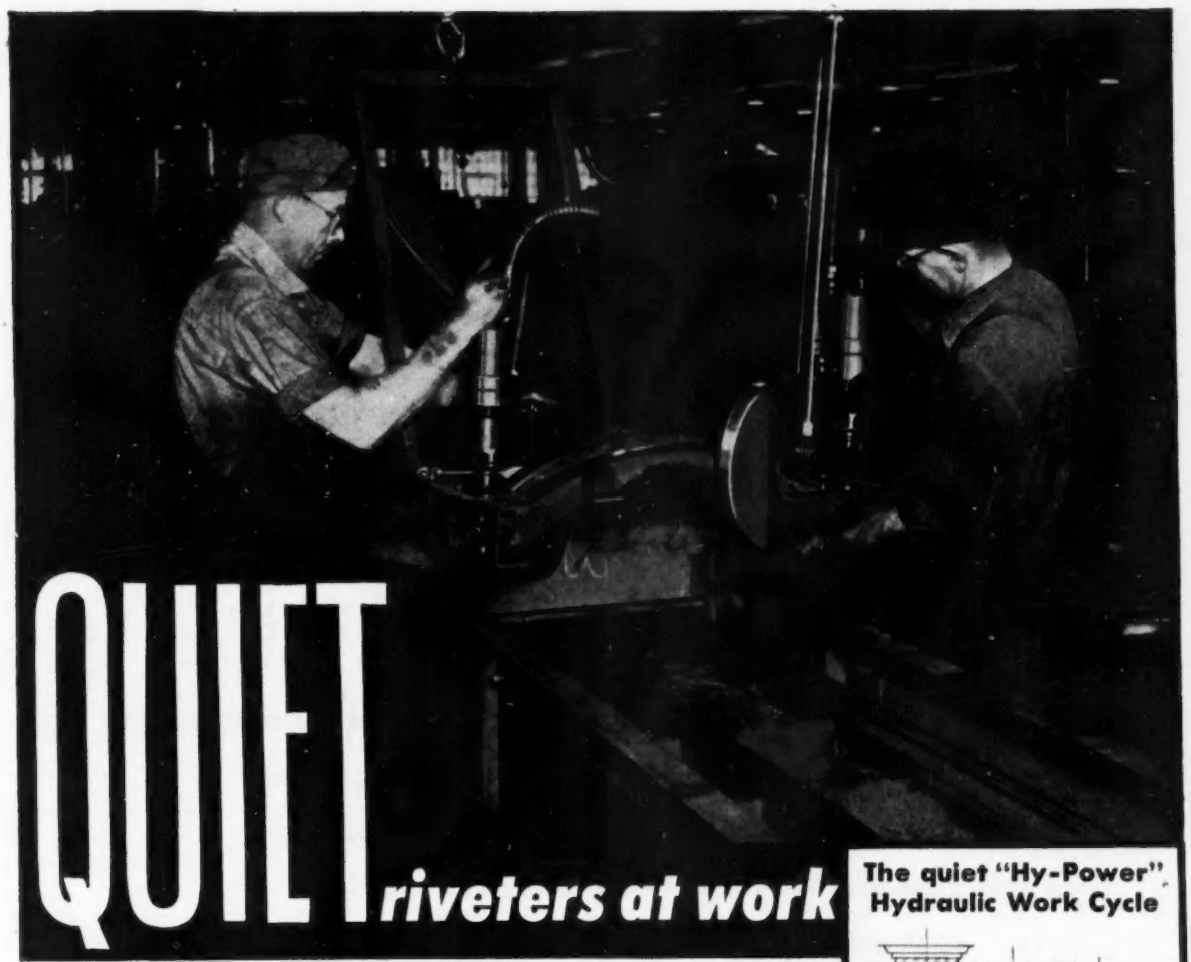
ACADIA Synthetic PRODUCTS

DIVISION OF WESTERN FELT WORKS

4021-4139 W. Ogden Ave., Chicago 23, Illinois

Branch Offices in Principal Cities

MANUFACTURERS AND CUTTERS OF WOOL FELT



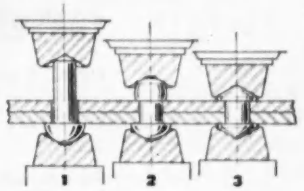
QUIET *riveters at work*

. . . not a sound as rivets are cold formed in 2½ seconds . . . each the exact counterpart of its neighbor... because Hannifin "Hy-Power" Riveters are at work.

These modern production tools, widely used in the highly competitive automotive industry to reduce costs and improve production, greatly simplify and speed up riveting. What's more, by riveting cold with this "silent squeeze" method, operators get a better, stronger riveted joint, every time. Hannifin "Hy-Power" portable and stationary yoke riveters are available in capacities from 7½ tons to 100 tons (more in multiple). Powered by the exclusive, patented "Hy-Power Hydraulic Generator, their quiet, automatic cycle is started with a touch of a button—yet, for safety, the stroke can be interrupted and the ram reversed at any point in the cycle, simply by releasing the control button.

If you rivet, stake, punch, press or bend, there's a place in your production picture for Hannifin "Hy-Power" equipment. Hannifin Field Engineers are located in leading industrial centers to advise you. Hannifin Corporation, 543 Wolf Road, Des Plaines, Ill.

The quiet "Hy-Power" Hydraulic Work Cycle



Hydraulic pressure, under instant, reversible, finger-tip control, silently squeezes rivets in this manner:

1. Fast approach (completed)
2. Rivet being squeezed
3. Rivet formed; ram returns



WRITE FOR BULLETIN 150

This bulletin tells the complete story of how Hannifin "Hy-Power" Hydraulic equipment can help you. Write today . . . a copy will be on its way tomorrow.

do ALL you can do . . . with

HANNIFIN

Air and Hydraulic Cylinders • Hydraulic Presses • Pneumatic Presses • "Hy-Power" Hydraulics • Air Control Valves

Conomatics demonstrate carbide tools

We believe you know that not every "automatic" job can be tooled successfully with 100% carbide. What we think you may not know is that the Conomatic Carbide Development program is making progress with such jobs. This relatively new Cone service is convincing to those who like to be shown that "it can be done".

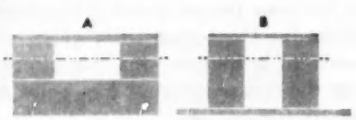
Granted that experimental runs are not production runs, it has often been proved that under actual production conditions they have developed into production runs. A number of conditions must be met in the successful use of any tooling material. Carbide is no exception. If the comparisons of 100% carbide and HSS runs indicate as much gain as per the job illustrated, the reward is worth the effort.

For full particulars please consult your Cone Representative or inquire direct.

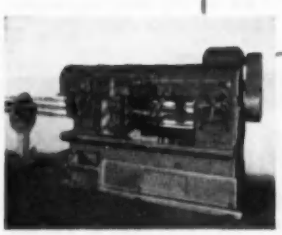


MATERIAL—EVERDURE: (96% copper, 3% silicon, 1% manganese) Hole drilled with 17/32" drill to 1½" depth; thread rolling of ½" pipe thread.

	HSS	CARBIDE
Cycle Time	35 secs.	15 secs.
Work Spindle Speed	420 R.P.M. at 124 S.F.	850 R.P.M. at 250 S.F.
Tool Wear	2000 pcs. per grind	5000 pcs. per grind



The CONOMATIC is the ONLY representative of Frame "A". The short, "weave-proof," upright members, secured between larger and heavier top bed and base, make possible the strongest type of bridged support to the tooling area and its "work and tool axis."



Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



It's welded—
but you can't feel the weld



It has to be accurate



It's easy to fabricate

Specify Brainard FOR WELDED STEEL TUBING

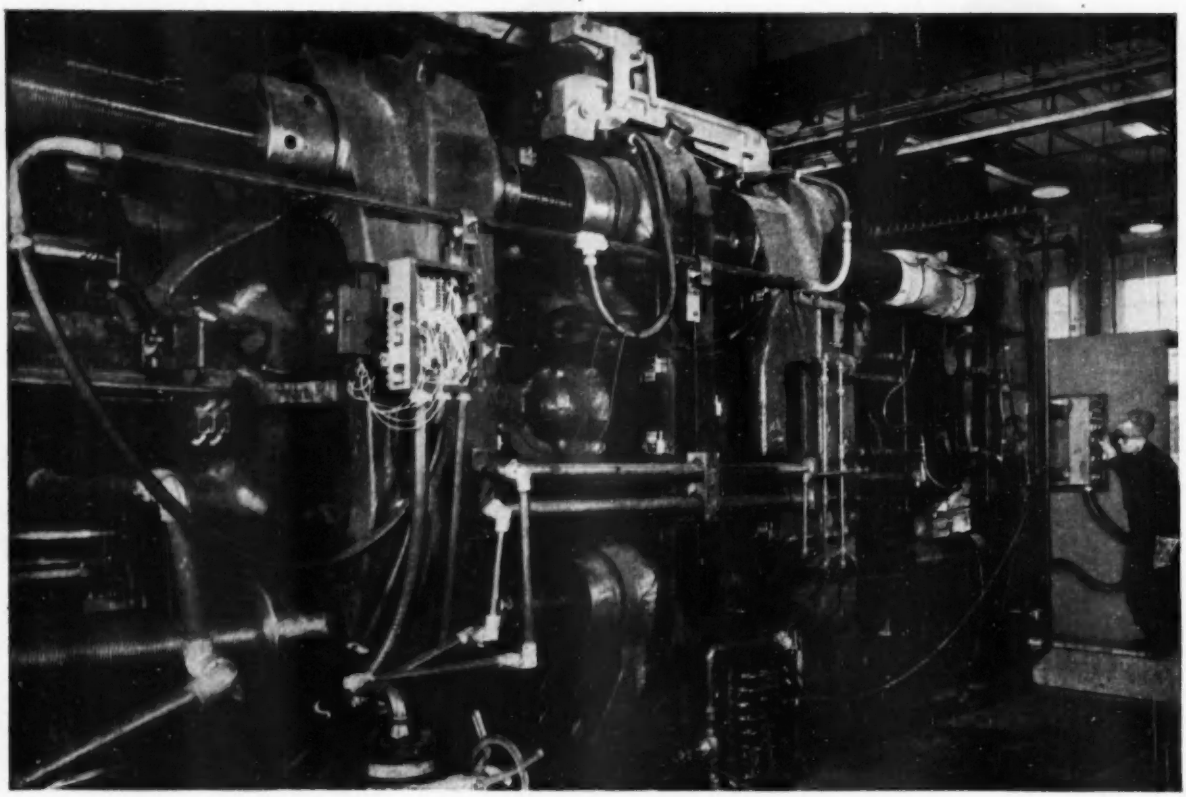
● Brainard welded tubing is an economical structural material, and offers many physical advantages. It has a smooth exterior, with all weld flash removed. Its wall thickness is uniform, since it is formed from flat strip. With welded tubing you can cut weight without sacrificing strength. And there's practically no limit to the design requirements you can meet with this easily fabricated material.

Brainard maintains continuous quality control throughout manufacture—from ore to finished tubing. Careful supervision assures you high quality. For complete specifications call or write Brainard Steel Division, Dept. W-9, Griswold St., Warren, O.

Brainard

SHARONSTEEL

STEEL DIVISION
SHARON STEEL CORPORATION



The leader, Doehler-Jarvis, takes another step forward...a Giant 72-inch die casting

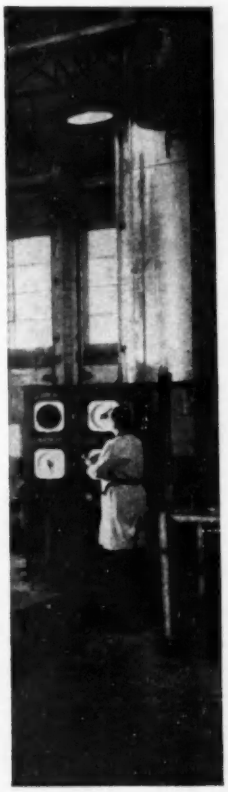
In one tremendous thrust Doehler-Jarvis has broken through the "size barrier" that limited pressure-cast metal components to comparatively small dimensions and light weights.

The new 250-ton machine recently put into operation by Doehler-Jarvis can produce aluminum castings weighing up to 75 lbs. and measuring practically anything that will go between the tie-bars. Adapted to zinc, it can handle shots up to 200 lbs.

Ever since the invention of the first practical pressure die casting machine about a half century ago, many people have felt that "Doehler and die casting" were synonymous. It's common knowledge that just about every "first" in this fast, efficient process of forming metal parts has been credited to the Doehler organization.

This new machine is, in a way, the culmination of fifty years of effort to widen the horizon for die cast components. And the effort will not stop here.

Why don't you put Doehler-Jarvis to work on your metal-parts problem?





Castings are removed from machine by mechanical "arms." Cable reel flanges shown here weigh 41 lbs. as they come from the die, and 31 lbs. after gate and flash are removed.

This huge machine "eats up" about a ton of aluminum per hour. An automatic ladle was developed to handle this large metal consumption.

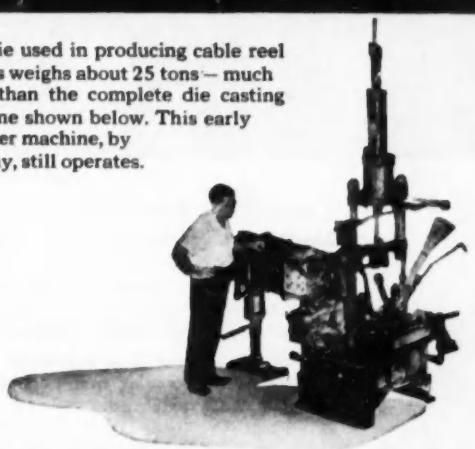


Stride...with this machine

Doehler-Jarvis Division
of
National Lead Company
General Offices: Toledo 1, Ohio

*Reg. U.S. Pat. Off.

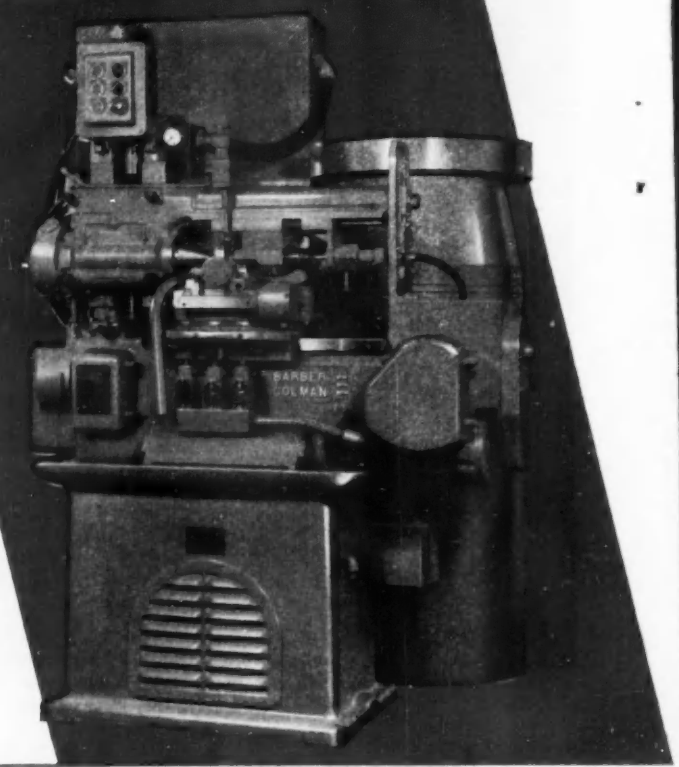
The die used in producing cable reel flanges weighs about 25 tons — much more than the complete die casting machine shown below. This early Doehler machine, by the way, still operates.

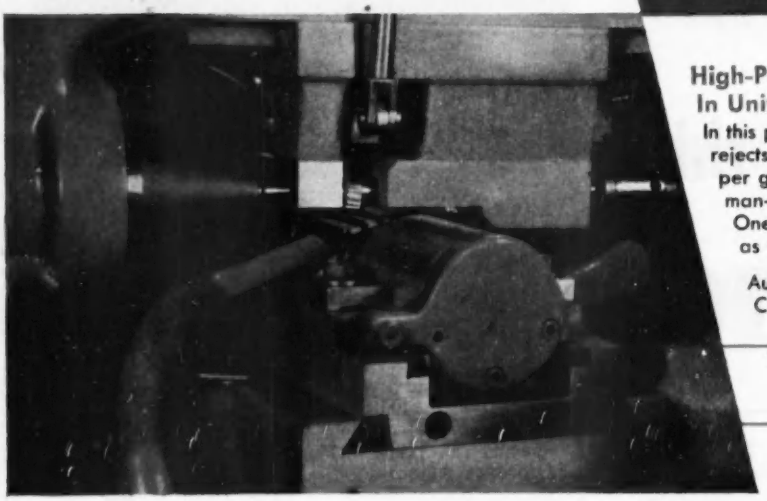


Fully Automatic GEAR HOBBING

offers
new low costs
on gears
16 pitch or finer

As more and more gear operations are modernized to place them on a competitive basis, automatic gear hobbing equipment becomes an essential approach in reducing gear costs. Since 1937 Barber-Colman engineers have been working closely with major gear producers in the application of automatic gear hobbing. At first, automatic hobbing applications were made in the watch gear and instrument fields. Later, machines were built for medium pitches in other fields, such as fishing reel gears. Now this latest Automatic No. 6-10 Hobbing Machine is designed specially for cutting automatic transmission and speedometer gears to meet the required rate of production on an automatic production line.





High-Production Plant Reports Savings In Unit-Costs with Fewer Gear Rejects

In this particular production plant, fewer gear rejects are occurring. An overall reduction in cost per gear has been effected through reduced man-hours and continuous high-speed output. One of a battery of machines performs as follows:

Automatic Cycle —	356 Hob RPM, 175 Hob SFM. .050" feed per rev., 60-second complete cycle time.
Transmission Gear —	16 teeth, 18° 30′ helix angle 18 DP., SAE 1330, .937" OD. x ⅝".
Class C Accurate Unground Hob	1⅞" dia. x 3" face x ¾" bore, 3 threads, unground, pre-shave.

Completely Automatic Cycle Provides Continuous High-Speed Gear Cutting

Blanks are automatically loaded through a hopper-feed system and positively located and clamped hydraulically on a solid arbor in cutting position. The cycle sequence includes rapid traverse to the hobbing position, lowering of the work slide to cutting depth, hobbing the blank, raising the work slide, rapid traverse to the right, and unload. A new blank then is automatically presented for hobbing and the cycle repeated continuously until the machine is shut off.

Machine features include automatic hob shifting for greater tool life and metered hydraulic pressure for positive arbor mounting and ejection. Rapid traverse is actuated electrically, and the work slide is hydraulically actuated.

B U I L D E R S O F P R E C I S I O N G E A R

Adaptable to Wide Range of Long-Run, High Speed Gear Production.

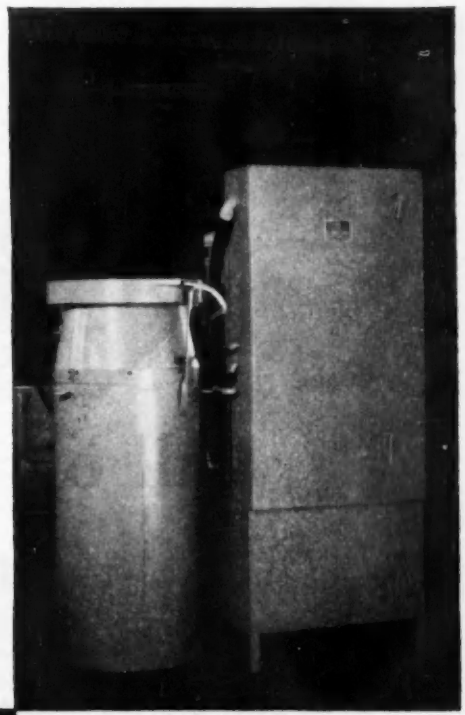
This type of cycle arrangement is adaptable to many similar long-run gear cutting operations within the general range of 16 pitch and finer, depending upon the particular gear specifications. The cycle is arranged to suit the requirements of the job, and tooling, feed, speed and cycle-timing will depend upon the required production and gear specifications.

Positive Control Over Gear Accuracy Through Automatic Arbor Loading.

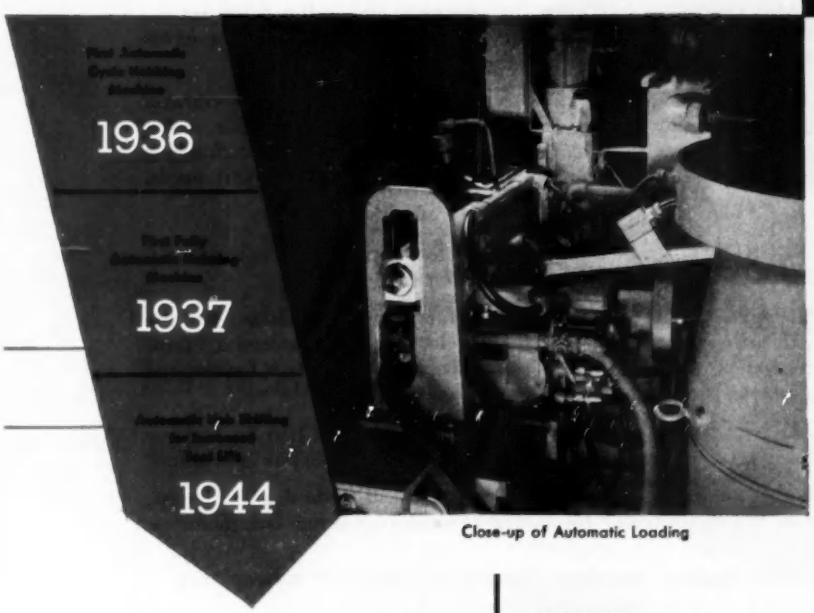
Barber-Colman automatic hobbing supplies positive gear accuracy control through specially developed tooling which mechanically mounts blanks solidly upon the work arbor prior to cutting. This arrangement eliminates chances for looseness, runout or vibration likely to occur in other types of mounting. Work arbors are designed for positive pick-up and location of the blank.

Cycle Fully Protected by Automatic Stops.

A combination of electric limit switches, program motor and mechanical movements governs the cycle. Faulty blanks are automatically rejected if presented for hobbing, and the machine is under complete control at all times.



Rear View Showing Automatic Loader and Electrical Panel



Close-up of Automatic Loading

Engineering Service Available Without Obligation

Check your high production gear operations to determine whether you are maintaining a competitive cost basis. Barber-Colman engineers will gladly consult with your gear production people to demonstrate the cost-saving benefits of automatic hobbing. Ask your Barber-Colman representative to arrange an appointment for you, or write directly to Automatic Hobbing Engineering. No obligation!

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 630 ROCK STREET, ROCKFORD, ILLINOIS

HOBS AND MACHINES SINCE 1911

To avoid vibrator troubles...



Call on MALLORY in the design stage

Power supplies will meet the toughest requirements of battery operated equipment if experienced engineering goes into the selection of each element . . . vibrator, transformer, and buffer capacitor . . . so that electrical characteristics are balanced to give maximum vibrator performance.

Call Mallory in the design stage and put an end to your vibrator problems. Mallory engineers will help you translate your power needs into a precisely engineered design . . . you'll save engineering time . . . you'll get the power performance your equipment needs.

In Vibrator design and production, Mallory offers you . . .

EXPERIENCE gained through years of working with leading manufacturers on a broad variety of vibrator applications.

VIBRATORS for civilian and military use . . . produced by the organization which pioneered the development of commercial Vibrators over 20 years ago and has supplied more Vibrators for original equipment than all other makes combined.

ENGINEERING AND PRODUCTION FACILITIES . . . to your most exacting requirements for vibrators or complete power supplies.

Whether your equipment is in production or still on the drawing board, write or call us today for complete information on our facilities.

Expect More...

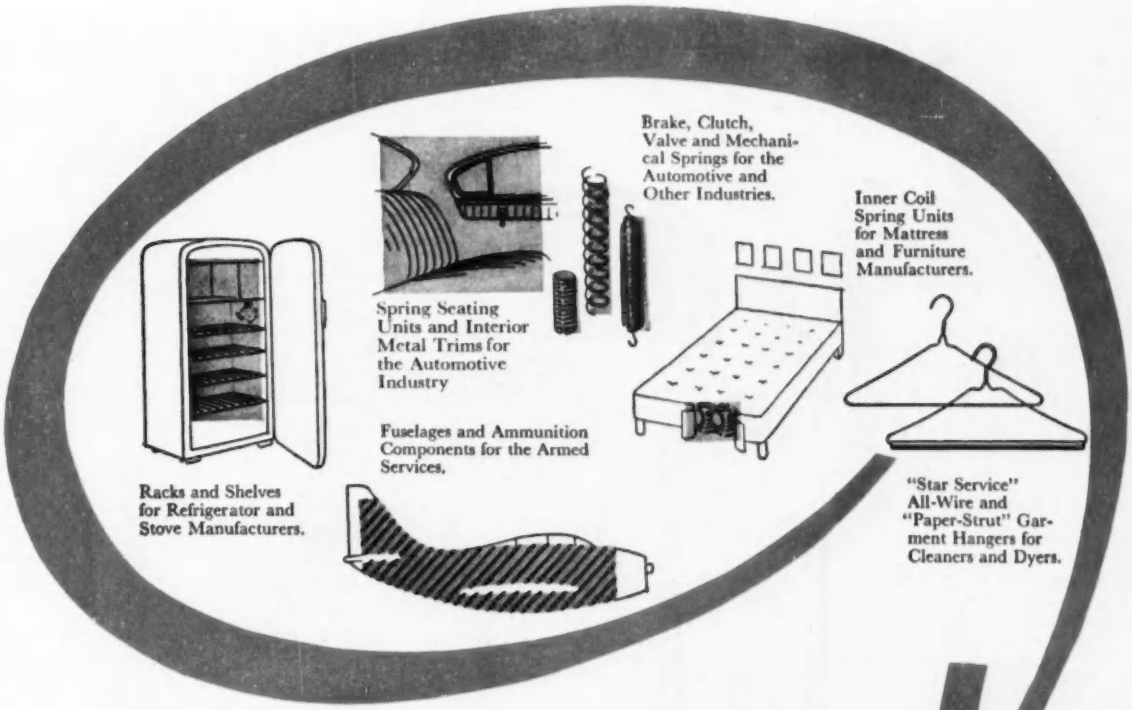
Get More from

MALLORY

Parts Distributors in all major cities stock Mallory standard components for your convenience.

Serving Industry with These Products:
Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA



L. A. YOUNG helps industries

SIMPLIFY OR SOLVE

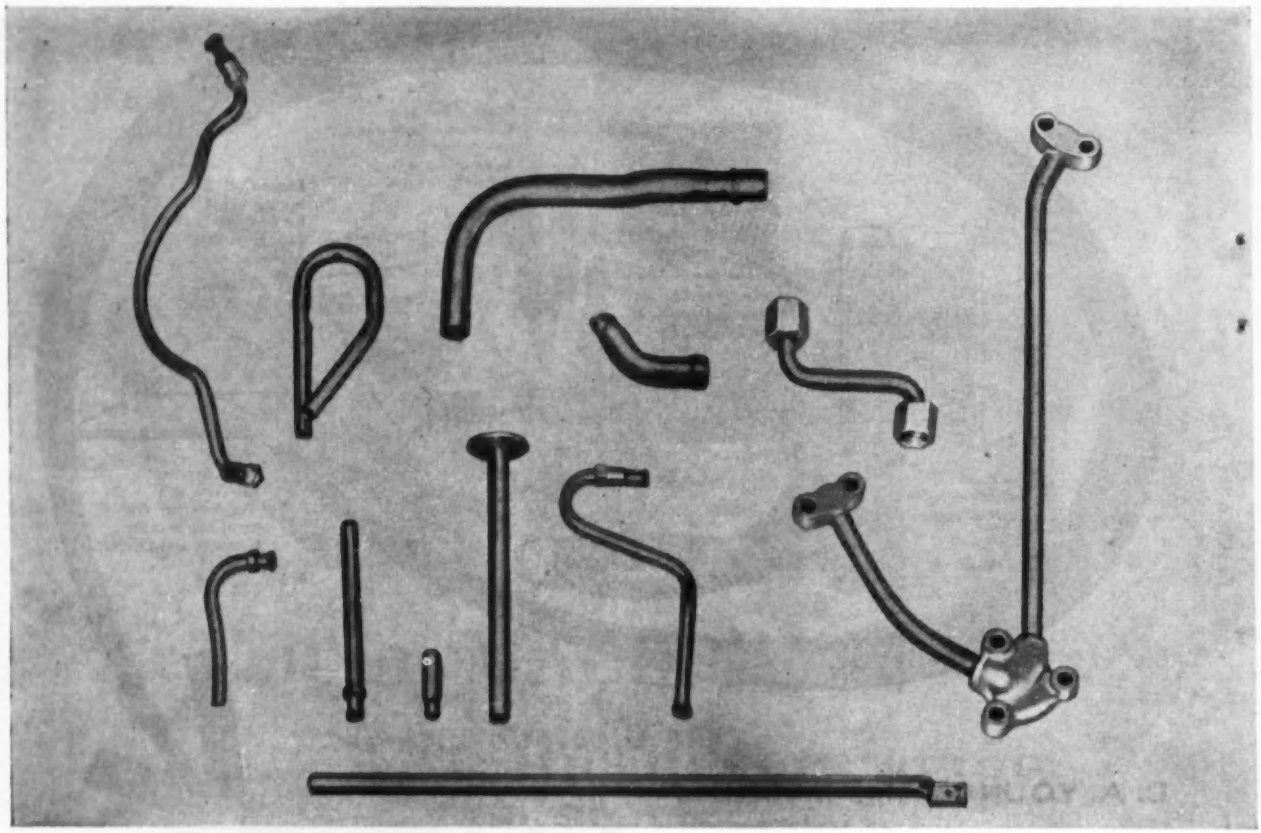
even the most difficult design & production problems



L. A. YOUNG SPRING & WIRE CORPORATION

GENERAL OFFICES • DETROIT 11, MICHIGAN

IN CANADA: L. A. YOUNG INDUSTRIES, LTD., WINDSOR, ONTARIO



A few samples of the wide variety of tubing parts produced for Bundy customers. Leakproof Bundyweld offers you absolutely dependable function in oil, gas, transmission lines, other vital tubing lifelines.

Bundyweld lifelines help farm machines bring in a speedy, profitable harvest



WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



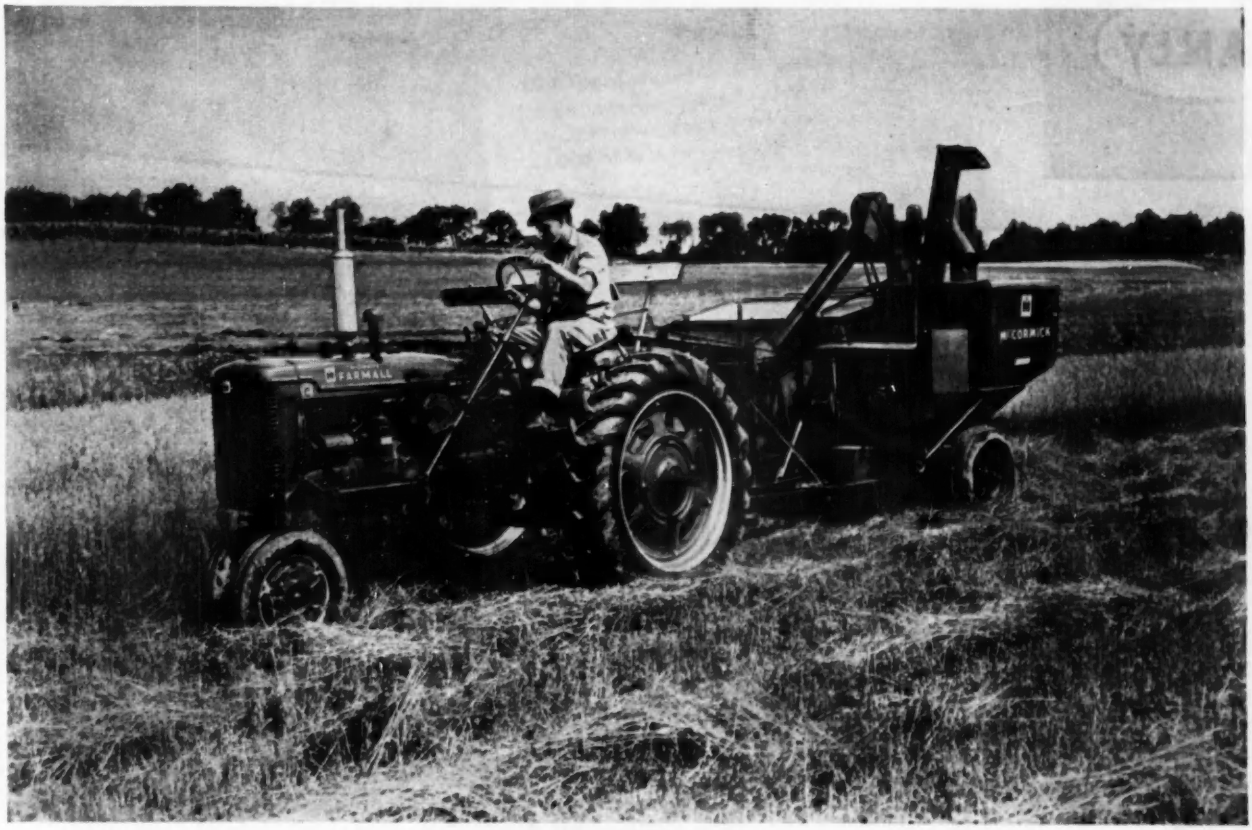
passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



← NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.



Above, International Harvester's McCormick No. 64 Harvester-Thresher, pulled by a McCormick Farmall tractor. Bundyweld parts like those pictured at left help assure this leading farm-machine manufacturer of dependable tubing performance.

Speed and efficiency are imperative at harvest time. That's why International Harvester's McCormick No. 64 balanced-flow harvester-thresher shows to such advantage, combining speedy, trouble-free operation with peak efficiency in saving more of the crop.

Naturally, International Harvester requires a dependable tubing for its famed products. *That's why Bundyweld Tubing is used for so many vital tubing lifelines.*

Bundyweld is leakproof by test; thinner walled yet stronger; can withstand heavy vibration fatigue, punishing wear; has high bursting strength; takes easily to standard protective coatings. It's the only tubing double-walled from a single metal strip, copper-brazed throughout 360° of double-walled contact.

Other Bundy plus-services you'll appreciate: expert engineering assistance; the industry's most technically advanced fabrication facilities; custom-packaging of orders; prompt, on-schedule deliveries. Let us help you with your farm machines, automobiles, trucks or buses. Call, write or wire.

BUNDY TUBING COMPANY
DETROIT 14, MICHIGAN

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Bundy Tubing Distributors and Representatives: *Bridgeport, Conn.:* Korhumel Steel & Aluminum Co., 117 E. Washington St. • *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tenn.:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • *Chicago 32, Ill.:* Lapham-Hickey Co., 3333 W. 47th Place • *Elizabeth, New Jersey:* A. B. Murray Co., Inc., Post Office Box 476 • *Los Angeles 58, Calif.:* Tubesales, 5400 Alcoa Ave. • *Philadelphia 3, Penn.:* Rutan & Co., 1717 Sansom St. • *San Francisco 10, Calif.:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Wash.:* Eagle Metals Co., 4755 First Ave., South • *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 181 Fleet St. East.
Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

DANLY

Blanking

COSTS LESS ON A DANLY PRESS

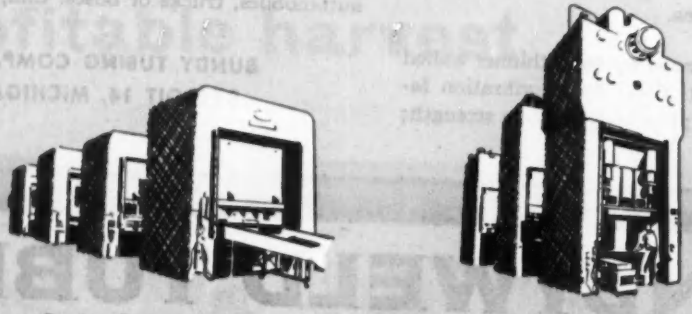
Unique new features, engineered for dependability, increase production

Now, blanking costs can be lower than ever before whether your operation calls for high speed lamination stamping at 400 strokes per minute or producing big blanks from coils or sheet.

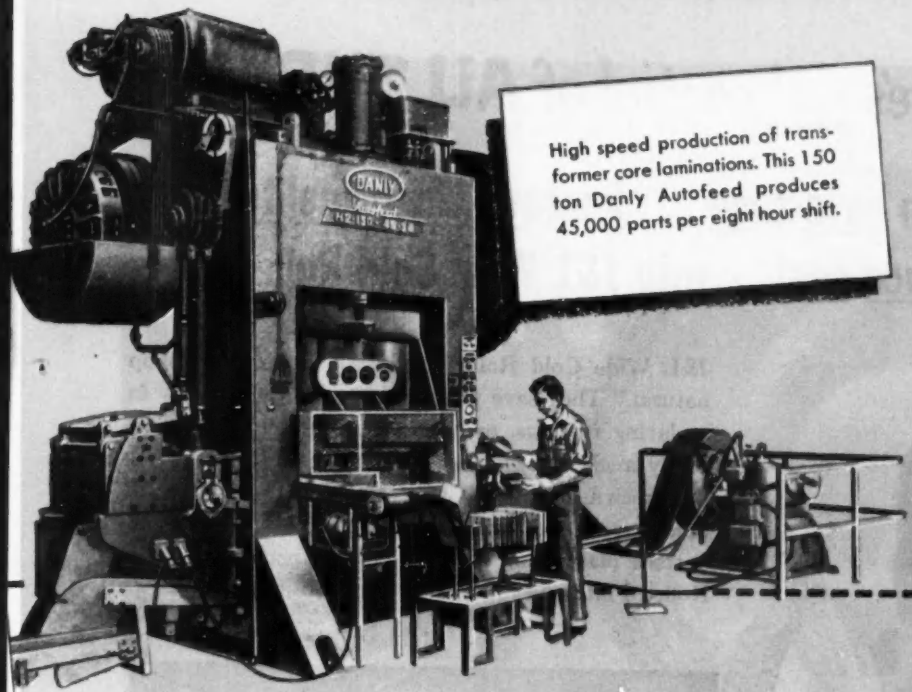
Why? Because Danly's heavier construction gives reserve strength to meet the demands of continuous peak load operation. Exclusive Danly electrical and pneumatic controls make automation of auxiliary equipment easier and faster . . . saving setup and change-over time. Extra rigidity increases die life. Automatic oil lubrication assures dependable performance and low maintenance costs.

Whether you are expanding or replacing facilities, it will be worth your while to talk to a Danly Press engineer.

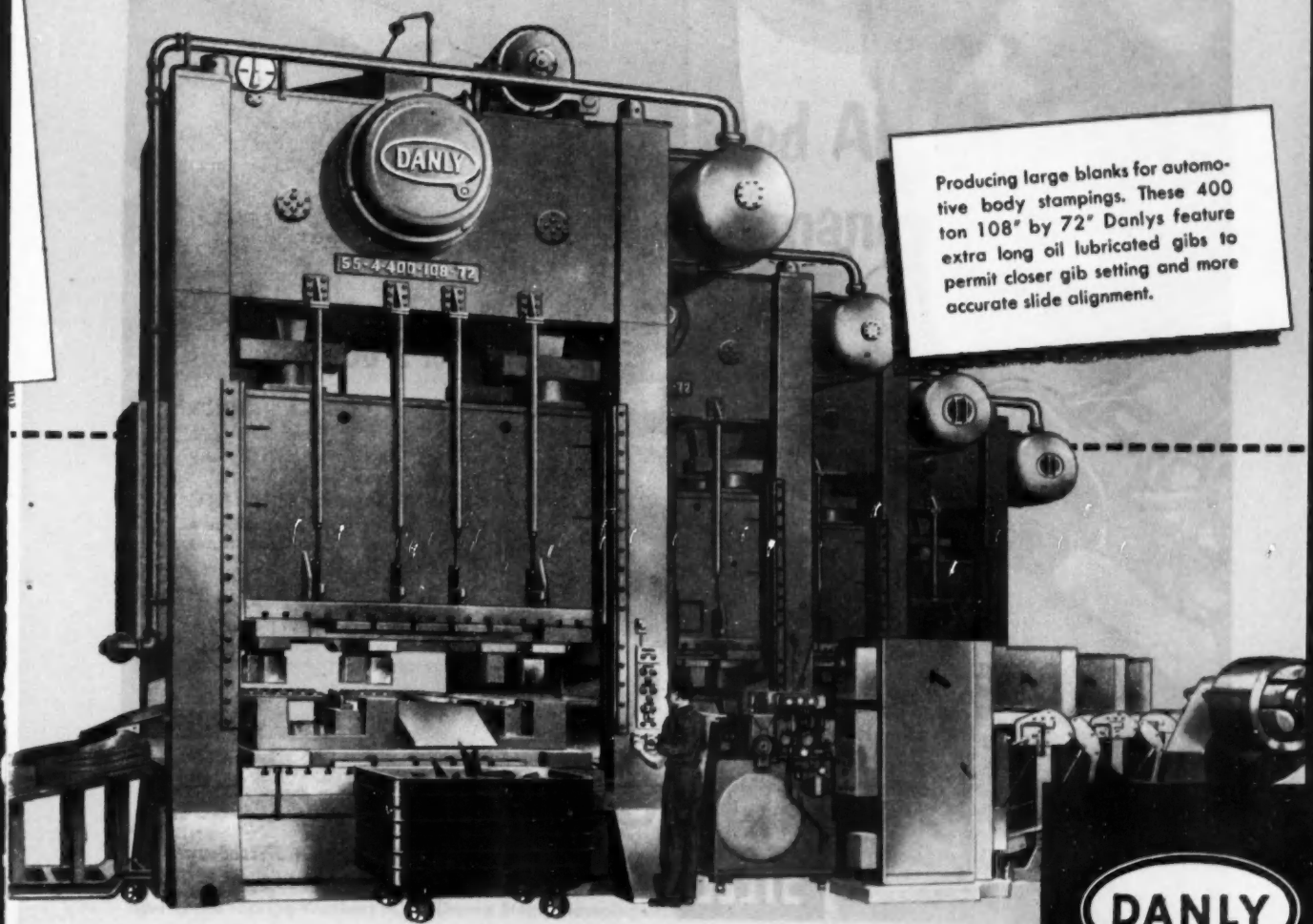
DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue, Chicago 50, Illinois



Danly offers any press you need for blanking, drawing or any secondary operation... single, double or triple action... overdrive or underdrive . . . to suit your plant layout. Make your press line a Danly line and save costs at every stage of your stamping operation.



High speed production of transformer core laminations. This 150 ton Danly Autofeed produces 45,000 parts per eight hour shift.



Producing large blanks for automotive body stampings. These 400 ton 108" by 72" Danlys feature extra long oil lubricated gibs to permit closer gib setting and more accurate slide alignment.

DANLY

Mon!...there's real control of ALL THREE

You can save time . . . improve work quality . . . reduce cost . . . with J&L Wide Cold Rolled Flats

J&L Wide Cold Rolled Flats are a "machine shop natural." They save you time, trouble, and money in replacing forgings, expensive castings, or parts ordinarily made from hot rolled plates planed to size.

In such applications as die build-ups, stripper plates, punch pads, jigs and fixtures, plate and die molds, pattern plates, and other machinery parts J&L Cold Rolled Flats offer outstanding advantages.



Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*



Eaton Self-Contained Air Brake provides important performance advantages

The new Eaton SELF-CONTAINED air brake offers a number of outstanding advancements over other truck brake designs. For a given input greater braking effort is delivered at the drum. Compact, close-coupled design, combining a strong rigid chamber bracket mounted directly on the brake spider and a short camshaft supported entirely in the chamber bracket, provide reduced bracket deflection, reduced camshaft wind-up, and shorter required chamber stroke resulting in quicker truck stops.

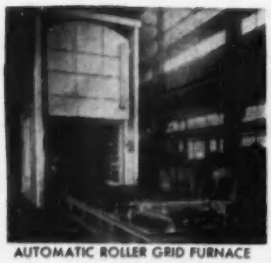
Simply constructed with fewer parts, over-all weight is reduced approximately 15%. Advanced floating split-shoe design using a single pin at the anchor end and trunnion type rollers and pins at the cam end of the shoe eliminates the need for anchor-pin lubrication, makes for quick action and quick release and prevents pin seizure. Exhaustive tests show important increases in lining life—as much as 100%.

Overhauls are required less frequently, and when necessary, service time is reduced greatly, cutting labor as much as 2 to 4 hours per job.

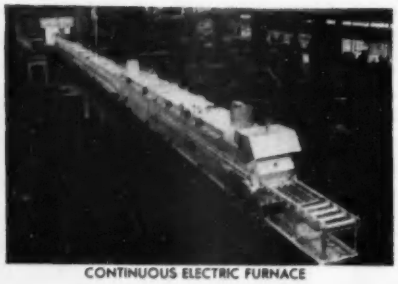
Greater braking efficiency
•
Quicker acting
•
Quicker releasing
•
Longer lining life
•
Quick, easy reline
•

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

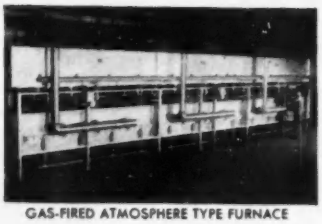
PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



AUTOMATIC ROLLER GRID FURNACE



CONTINUOUS ELECTRIC FURNACE



GAS-FIRED ATMOSPHERE TYPE FURNACE

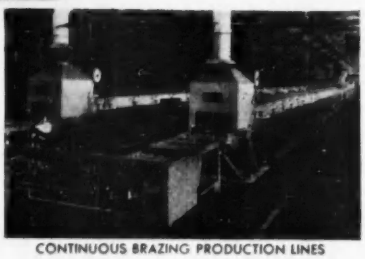
BIG ONES



AUTOMATIC ROTARY HEARTH FURNACE



ALUMINUM BILLET HEATER



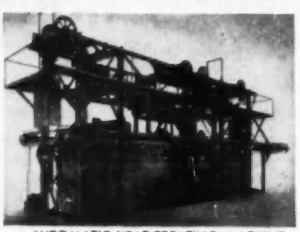
CONTINUOUS BRAZING PRODUCTION LINES



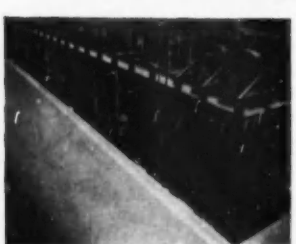
CONTINUOUS ROTARY RETORT FURNACE



CONTINUOUS CONVEYOR FURNACE



AUTOMATIC HEAT TREATING MACHINE



CONTINUOUS VITREOUS ENAMELING LINE

. . . all field-erected by Lindberg

Maybe you haven't heard the news. Lindberg is now set up to field-erect any type of industrial heating or processing installation. Here are just a few of the large field-erected installations already put up by Lindberg. More are being built right now.

You get a complete package deal from Lindberg. Expert engineers consult with you and analyze your needs. Then they plan and design an installation to meet your specific requirements, whether you need a single furnace or a complete production line. And Lindberg will build it for you, right in your own plant.

To get on-the-spot service from an expert Lindberg engineer, just call your nearest Lindberg Field Office (you'll find the number in the classified section of your phone book, or in the Trade Directories).

LINDBERG INDUSTRIAL

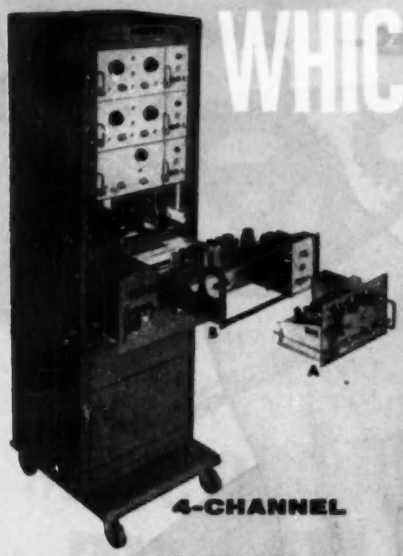
LINDBERG INDUSTRIAL CORPORATION

Chicago Plant: 2321 West Hubbard Street, Chicago, Illinois

Los Angeles Plant: 11937 Regentview Avenue, at Downey, California

Field Offices in principal cities. **Associate Companies:** Lindberg Engineering Company, Chicago • EFCO-Lindberg, Ltd., Montreal • Lindberg Italiana, Milan, Italy

WHICH "150" fits your oscillographic recording need?



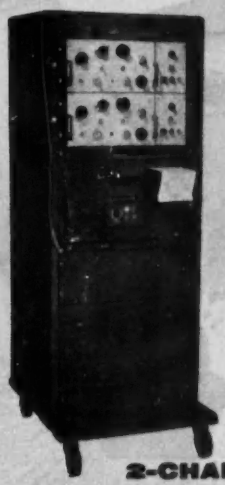
4-CHANNEL

As a graphic example of the design idea that has brought new versatility to industrial recording, a Carrier Preamplifier (A) is shown above in position to plug into a Driver Amplifier in framework with Power Supply (B) which are normally already in place in the Basic Cabinet Assembly.

The identical design principles of the four-channel system are provided in the two-channel, the only difference being the number of channels.

Sanborn "150" Recording Systems that put to use the original design concept of amplifier interchangeability (illustrated at the left) start with either a four-channel or two-channel standard Basic Assembly, to which the user adds whatever selection or combination of pre-amplifiers (A) are needed for his recording problem. The standard Basic Assemblies comprise a metal Cabinet, Recorder, and a built-in Driver Amplifier and Power Supply (B) for EACH channel. Presently available Preamplifiers are: AC-DC, Carrier, DC Coupling, Servo Monitor, Log-Audio, and Low Level Chopper.

Advantages common to ALL Sanborn Recorders are: inkless recording (by heated stylus) on plastic coated strip chart paper, and in true rectangular coordinates . . . high torque galvanometer movement . . . time and code markers . . . numerous paper travel speeds.



2-CHANNEL

"150"

COMPLETE FOUR-CHANNEL SYSTEM FOR USE WITH ANALOG COMPUTERS

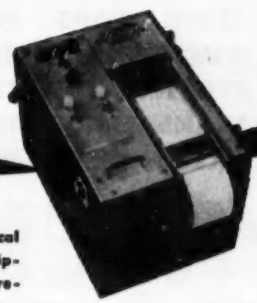
This "150" system consists of a Cabinet Assembly, a four-channel Recorder, and *two* dual channel DC Amplifiers. Each amplifier is complete with a common power supply. Each measures and records two separate single-ended signals, at sensitivities between one and one hundred volts per centimeter. The *two*-channel version of this system will comprise Cabinet, *two*-channel Recorder, and *one* dual channel amplifier.



"150"

SINGLE-CHANNEL RECORDER

A compact, lightweight unit for use when only one channel is required — provides permanent, inkless recording in *true* rectangular co-ordinates; *five* paper speeds (5, 10, 25, 50, 100 mm/sec.); *extra* stylus for either manual or remote timing and coding marks. Designed for simple, patch cord connection to *any* of the several "150" preamplifiers (plus driver amplifier and power supply), available soon in portable metal cases.



Ask, also, for a copy of the *Right Angle* — a Sanborn publication devoted to oscillographic recording in industry.

Catalog and technical data on all "150" equipment available on request.

SANBORN COMPANY

Industrial Division

CAMBRIDGE 39, MASS.

FOR TODAY'S *Push Button* CONVENIENCES—

AMERICAN BOSCH
SMALL ELECTRIC MOTORS



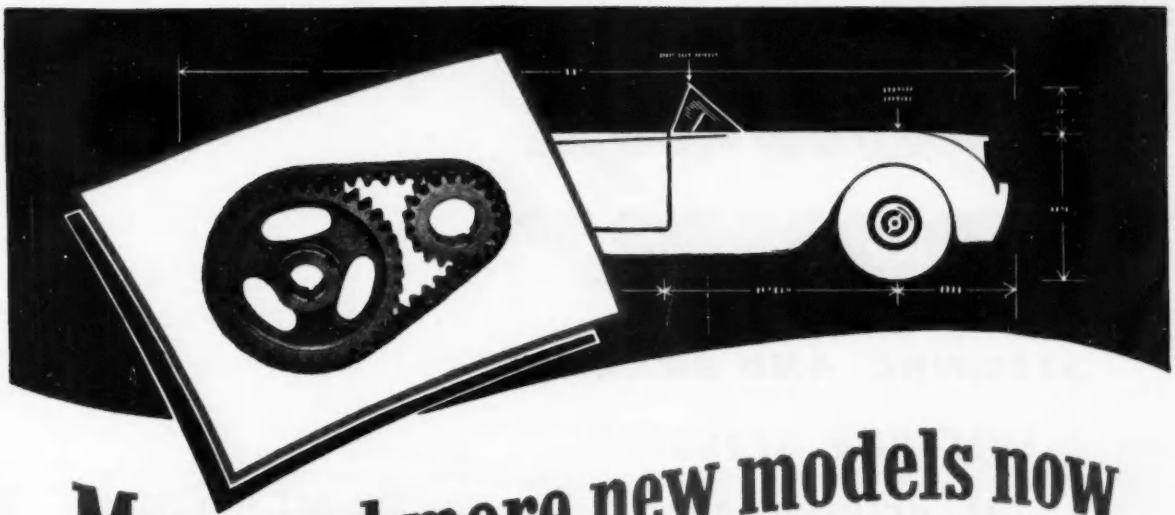
to power—

WINDSHILD WIPERS • SEATS • TOPS • HOODS • WINDOWS • VENTILATORS • STARTERS • HEATERS • TRANSMISSION AND AXLE MECHANISMS

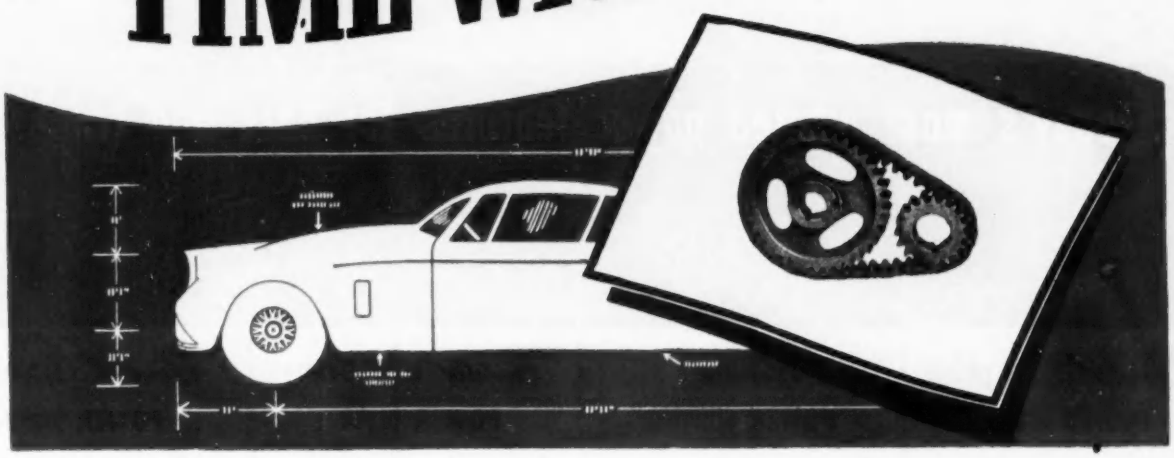
Well built, with characteristic AMERICAN BOSCH precision quality, these high-torque small Motors are sturdy, quiet, powerful and dependable. Just a few of the good reasons they are already in wide use as original equipment. If you have one or a number of small motor requirements in your designs, put the problem up to American Bosch, Springfield 7, Mass.

AMERICAN BOSCH





More and more new models now TIME with CHAIN



and LINK-BELT Timing Chain gives you

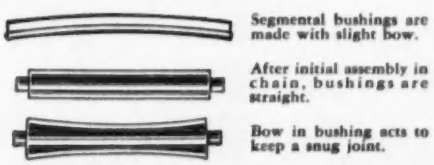
Automatic joint snugness **Smoother operation** **Longer life**

FOR greater design flexibility plus superior performance, leading automotive manufacturers are swinging to timing chain. Let our engineers show you how this outstanding chain can fit into your latest engine. Engineering and specification details are available in Book 2065.

LINK-BELT

TIMING CHAIN and SPROCKETS

Segmental bushings provide automatic joint snugness



Segmental bushings are made with slight bow.

After initial assembly in chain, bushings are straight.

Bow in bushing acts to keep a snug joint.

LINK-BELT COMPANY: 220 South Belmont Ave., Indianapolis 6, Ind. Offices in principal cities. 13,324

Bendix power

STEERING AND BRAKING

sets new standards of driving ease and safety

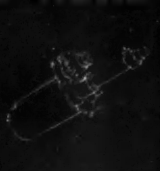


Today's most wanted power features for cars and trucks









Bendix * low pedal POWER brake

Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!

Bendix * POWER steering

Because Bendix Power Steering is of the linkage type, vehicle manufacturers find it especially adaptable for production line installation, without extensive engineering changes. Manufacturers can now meet the increasing demand for power steering more efficiently and more economically with Bendix Power Steering.

Bendix HYDROVAC* POWER brake

With over four million in use, the Bendix Hydrovac is by all odds the world's most widely used power brake for commercial vehicles. This overwhelming preference for Hydrovac is a result of sound engineering design, exceptional performance, low original cost and minimum service upkeep.

Bendix AIR-PAK* POWER brake

With one simple compact unit, Bendix Air-Pak combines all of the well-proven advantages of hydraulic brake actuation with an air brake system. An important advantage of Air-Pak is that brakes can be applied by foot power alone when braking is required before air pressure builds up or if it should fail for any reason.

*REG. U.S. PAT. OFF.

Prospects are easier to sell and owners are better satisfied with cars equipped with Bendix power steering and braking.

For example, the Bendix Low Pedal Power Brake is by all odds the most popular and best proven power brake offered by any passenger car manufacturer today, and vehicle manufacturers can quickly and economically adapt the popular Bendix Power Steering to their present design without extensive engineering changes.

For truck manufacturers and operators, Bendix Hydrovac and Air-Pak have long been overwhelming favorites in the field of power braking for commercial vehicles.

That's why if you build, buy or sell passenger cars or trucks, it will pay to make sure they are equipped with Bendix power braking and steering.

Bendix Products Division

BENDIX PRODUCTS DIVISION SOUTH BEND INDIANA

Bendix AVIATION CORPORATION

Export Sales: Bendix International Div. 205 E. 42nd Street, New York 17, N. Y.

AUTOMOTIVE INDUSTRIES

BUSINESS DEPARTMENT

G. C. Buzby, President and Manager
Automotive Division
E. H. Miller, Advertising Mgr.
E. W. Hevner, Circulation Mgr.
John Pfeffer, Promotion Mgr.
Charles W. Hevner, Research Mgr.
Chestnut and 56th Sts.
Philadelphia 39, Pa.
Phone GRanite 4-5600

REGIONAL MANAGERS

CHICAGO—John T. Hoole
916 London Guarantee
and Accident Building
Chicago 1, Ill.
Phone FRanklin 2-4243

DETROIT—E. E. Elder
1015 Stephenson Bldg.
Detroit 2, Mich.
Phone TRinity 5-2090

PHILADELPHIA and NEW YORK—
Nelson W. Sieber
Chestnut and 56th Sts.
Philadelphia 39, Pa.
Phone GRanite 4-5600
and
100 East 42nd St.
New York 17, N. Y.
Phone OXford 7-3400

CLEVELAND—Jack C. Hildreth
1030 National City Bank Bldg.
Cleveland 14, Ohio
Phone CHerry 1-4188

SAN FRANCISCO—
R. J. Birch and Frank W. McKenzie
300 Montgomery St.
San Francisco 4, Calif.
Phone DOuglas 2-4393

LOS ANGELES—L. H. Jackson
3156 Wilshire Blvd.
Los Angeles 5 Calif.
Phone DUnkirk 7-2119

●

One of the Publications
Owned by
CHILTON CO. (INC.)
Executive Offices
Chestnut & 56th Sts.
Philadelphia 39, Pa., U.S.A.

Officers and Directors
President
JOSEPH S. HILDRETH

Vice Presidents
G. C. BUZBY
P. M. FAHRENDORF
HARRY V. DUFFY
Treasurer—WILLIAM H. VALLAR
Secretary—JOHN BLAIR MOFFETT
GEORGE T. HOOK
TOM C. CAMPBELL
MAURICE E. COX
FRANK P. TIGHE
L. V. ROWLANDS
ROBERT E. McKENNA
IRVING E. HAND
EVERIT B. TERHUNE, Jr.

High Spots of This Issue

★ **Small Engines Standardized for the Armed Forces**

Profiting from the hard lessons of WW II, when more than 340 different industrial gasoline engines were used, the military services are undertaking standardization. This account tells of the work being done at Fort Belvoir, Va. See Page 48.

★ **Power Train of Tractor Shovel Has Special Transmission**

Quite a number of novel and interesting design features are to be found in the power train of Clark's Michigan tractor shovel. The special transmission with constant mesh gears and other components are fully described and depicted. Page 52.

★ **Automotive Industry Key to Russian Mobilization Plans**

In the vast Soviet Union, just as in the U. S., the automotive industry is a fundamental cornerstone of both the civilian and military economies. Its organization and operation in the USSR are carefully analyzed in this study. Page 56.

★ **Increasing Use of Diesels in European Passenger Cars**

While it long since became a popular powerplant for heavy trucks and buses, the Diesel engine is just coming into its own in the European car field. Some outstanding types and their specifications are studied by the author. Page 66.

★ **An Evaluation of a V-6 Aluminum Engine**

Continuing research gives every promise of bringing cast aluminum parts for automotive engines closer to reality. As an example of the practical work being done in the field, the Lancia B-10 engine is scrutinized. Page 70.

★ **31 New Product Items**
And Other High Spots, Such As:

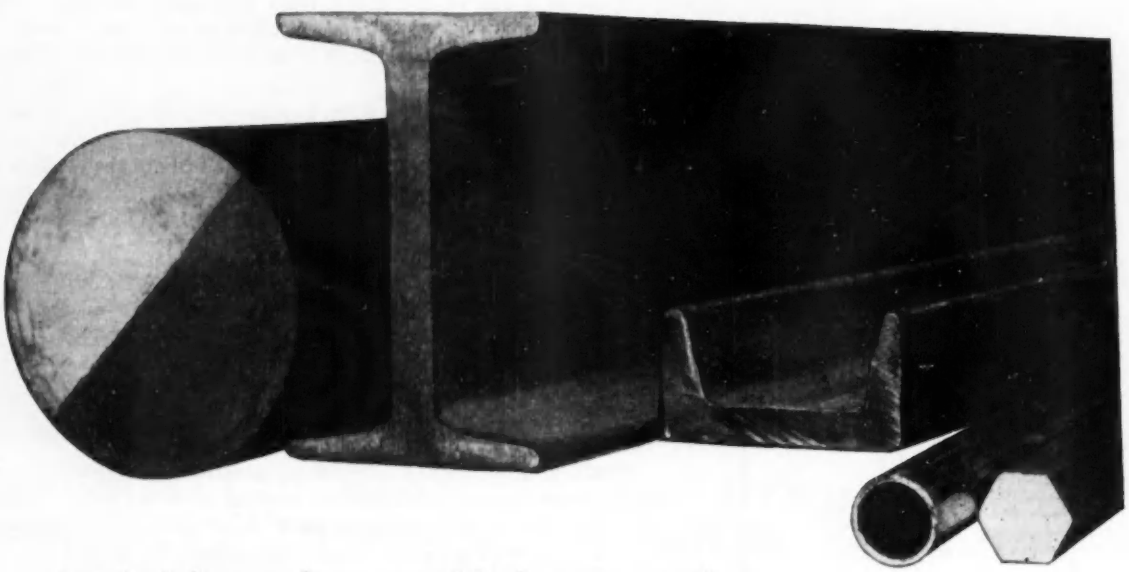
Special device for ball joint suspensions; prospects for torsion bar suspension on U. S. cars; precision shaping of panoramic windshield glass; six-stroke engine tested in Switzerland; floating-hub wheel; SAE West Coast meeting; and Brazil encourages new truck factories.

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3





call Ryerson for steel carbon, alloy, stainless



Quick delivery from world's largest stocks

Whether you need a single piece or a truckload you can depend on prompt, personal service from your nearby Ryerson plant. So, for every kind of steel—when you need it—call Ryerson.

RYERSON CERTIFIED STEELS

RYERSON STEEL

Principal products in stock: bars, structurals, plates, sheets, tubing, alloy & stainless steel, reinforcing, etc., also machinery & tools

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 111, No. 6 **September 15, 1954**

Automobile Workers Win Cent-An-Hour Increase

A one-cent hourly pay increase has been granted to more than one million automobile workers as the result of higher living costs. Largest single group affected by the increase are some 375,000 General Motors hourly workers. More than 200,000 hourly workers at Ford and Chrysler are also covered by the UAW contracts.

Under the formula, wages are reviewed quarterly and adjusted in line with changes in the Government's cost-of-living index. The index also affects the pay of several thousand non-union, salaried employes in the automobile industry. Their pay goes up or down about $5 a quarter for each cent-an-hour adjustment in the wages of production workers.

The last adjustment in wages in the automobile industry was made in June, when workers were granted a five-cent-an-hour increase under the annual "improvement factor," which is designed to reflect technological progress and other productivity improvements. The hike then, however, was reduced one cent because of a dip in the cost-of-living index.

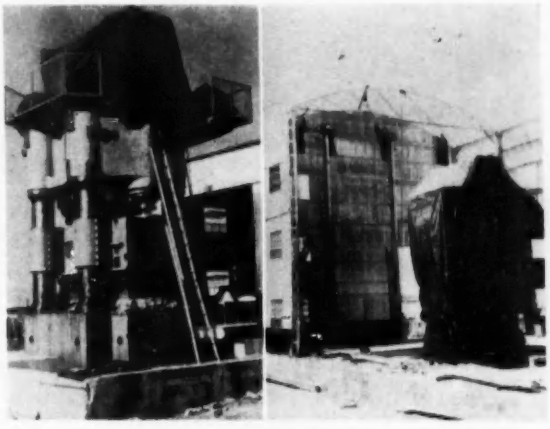
Packard Starts Moving Into Conner Ave. Plant

Although Packard Motor Car Co. will be using about two million sq ft less manufacturing space when it completes moving its operations to the newly acquired Conner Ave. plant in Detroit, production capacity will be substantially higher. The company recently started to transfer its final assembly operations from its Grand Blvd. plant to the Conner unit, and expects to complete the move by the middle of November.

During the moving process, Packard will continue some work at the Grand Blvd. plant, primarily on defense assignments, machining of parts, and maintenance operations. Although the move will idle approximately 3000 of the 9000 workers, the company's skilled labor force will be kept active installing new jigs and fixtures.

GIANT'S HOME

Temco Aircraft Corp. literally constructed an entire building around a 5000-ton aircraft press recently. The huge unit, built by Hydraulic Press Mfg. Co., was first erected outdoors and covered with canvas. Steel workers then began putting up the building which houses the press and other needed foundry forming equipment.



General Motors Baffled By Proposed Tax Refund

General Motors Corp has expressed surprise at a report that the Internal Revenue Bureau has approved tax refunds totaling $206 million for the 1943-47 period. The corporation said that the sole claim pending amounts to less than $4 million.

GM said that the possible refunds of taxes for those years may include unused excess profits tax credits which it received in 1946 and 1947 and used to reduce its provision for Federal taxes for 1945 and 1946.

However, while the credit against excess profits taxes amounted to $193 million, GM said it automatically increased the corporation's liability for normal tax by about $97 million, so that the net credit amounted to $96 million.

Ford Starts Production At Its Cleveland Plant

Production of hoods started initial operations at the huge Ford stamping plant in Cleveland last month. Stampings for Ford, Mercury, and Lincoln cars will be produced at the plant and shipped to the company's assembly plants throughout the country.

The plant, which will be equal in size and productive capacity to the company's Buffalo unit, will employ more than 3000 at peak capacity. The original section of the plant is now 80 per cent completed. Construction plans call for a total of 960,000 sq ft of manufacturing floor space.

New York Hudson Dealers Get Nash Metropolitan

American Motors Corp. this month started distributing the Nash Metropolitan car to Hudson dealers in the New York region. The company said that all other Hudson dealers throughout the U. S. and Canada will be stocked with the car as soon as production permits, with Boston dealers next on the schedule.

News of the AUTOMOTIVE



REDESIGNED MARTIN BOMBER TAKES TO THE SKIES

The B-57B, latest model of the Martin B-57 light bomber, has a completely redesigned cockpit and canopy, has been fitted with speed brakes on both sides of the fuselage, and has been revealed as a heavily-armed aircraft. One of its important features is a rotary bomb door which forms part of the fuselage bottom. Explosives mounted on the door are carried internally until the target is reached. The pilot then revolves the door, bringing it in to drop position.

Car, Tire Shortages Hit Plymouth, Ford

Two 1946 headaches came back to plague part of the automobile industry in August. First, Ford was temporarily delivering cars without a spare tire because of the strike in the rubber industry.

Even stranger is the case of Plymouth suffering from a shortage of cars. The company had set July 15 as the cut-off date for ordering the balance of 1954 model needs. When dealers under-ordered, Plymouth was caught short by an unexpected sales pick-up.

Kennametal Tests Gas Turbine With Titanium Carbide Parts

In announcing this month the completion of a continuous 100-hr test run of an experimental gas turbine at 1850 F to 1900 F and 30,000 rpm, Kennametal, Inc., disclosed that the critical temperature parts of the turbine were made of Kentanium, a sintered titanium carbide. Kennametal engineers stated that by increasing the operating temperatures from the present 1400-1600 F range to 1900 F, power in a jet engine would be raised approximately 50 per cent.

Lockheed to Build New Model Of Constellation Transports

Lockheed Aircraft Corp. has reported that it will build a new, high-payload line of Super Constellation air transports. They will incorporate 107 new design features, including wingtip fuel tanks for extended ranges and service starting soon.

The new orders boost past 570 the total number of all Constellations built or on order so far. Lockheed reported meanwhile that domestic and foreign airlines choosing the enlarged transports now number 18, also a record.

The Model G series will be powered by four 3250-hp Wright DA3 turbo-compound engines, each developing 100 more horsepower for climbing than DA1 engines now in use. This power gain was a major factor in authorization of the planes to take off at 137,500 lb.

U. S. Orders War Plants Kept Ready For Emergency

A new program for keeping vital war plants in operation, even though defense needs have decreased, has been announced by the Office of Defense Mobilization. Objective of the plan is to maintain a broad production base which could be turned rapidly to full capacity in the event of an emergency.

Under the plan, plants to be selected would include those which have been making products such as aircraft, machine tools, ammunition, tanks, and other military vehicles, involving a long-term process. These plants would be kept ready or near-ready for war production.

The plan as yet does not touch on the related problem of keeping defense-supporting industries making steel, electricity, aluminum and other basic items producing at a high level or at high-production capacity.

The program, expected to cost the Government several hundred million dollars a year, covers industries which produce 1000 major military items on which the U. S. spends 85 per cent of its military procurement funds. One way to keep the facilities ready, ODM said, is to feed them contracts for current production. Another method, it suggested, would be to make arrangements with companies to retain "a group of key managers, engineers and skilled workers who are familiar with the items to be produced."

Jackson to Present Talks On Indianapolis Race Cars

Robert T. Jackson, AUTOMOTIVE INDUSTRIES race car expert, is scheduled to give another series of illustrated talks on the latest developments in Indianapolis race car design.

The first of the talks will be Sept. 27 at Pennsylvania State Univ., State College, Pa.

The lectures will be made at SAE and ASME meetings throughout the country. Considerable interest was shown in this subject at a similar series of meetings addressed by Mr. Jackson during the 1953-54 season.

AND AVIATION INDUSTRIES

Biggest Changes in History Expected on New Automobiles

The 1955 car model changes are expected to be the most sweeping on record. They reportedly will include four new engines, nine completely new bodies and two modified styling jobs to accommodate wrap-around windshields. It is anticipated that four automatic transmissions also will show changes.

Horsepowers in practically every instance will be bumped substantially with a high of 250 to 260 expected. The first 1955 car is scheduled to appear early in October, most may well be out by Thanksgiving, latest in the January-February period.

Future of Kaiser Motors In State of Uncertainty

Kaiser Motors Corp. is facing difficult decisions about its future status in the automobile industry. The company is known to have tried to sell its entire operation to Chrysler, which did not express particular interest in the proposal.

Furthermore, reports that one or more plants might be moved to South America have been buttressed by the visit of Henry J. Kaiser to Brazil. Kaiser Motors is not considered a likely prospect for merger with existing U. S. automobile companies because of its debt structure.

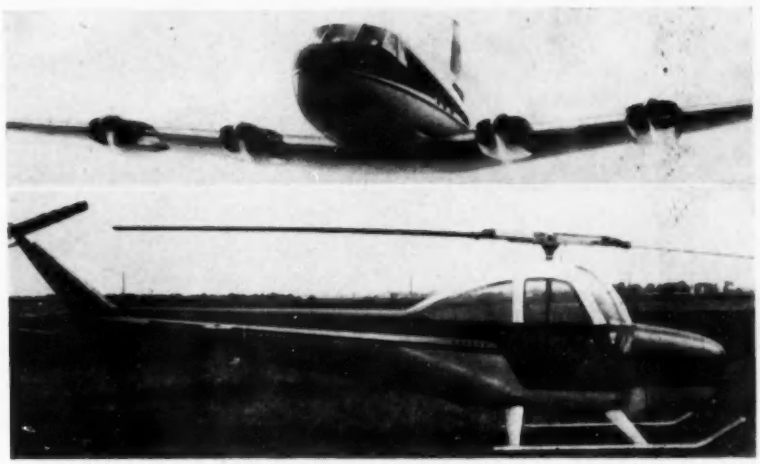
GM of Canada Nearing End Of Vast Expansion Program

Like its counterpart in the U. S. General Motors of Canada has been moving ahead with expansion programs in recent years. Since 1950 the Canadian company has spent approximately $100 million on new plants and facilities. In addition to a number of major plants, the corporation has erected almost a dozen parts buildings throughout Canada which have tripled its parts distribution facilities.

When the company completes construction of a 92,000 sq ft office building at its 400-acre site in South Oshawa next spring, it will mark the last phase of a vast program started in 1950. The key unit in the program is a 43½ acre assembly plant at Oshawa which is scheduled for opening this fall. It will boost the company's production potential by 25 per cent over 1953.

Other units which have sprouted up at the Oshawa site include a 25½ acre body assembly plant; a 17-acre final assembly plant for the production of Buick and Oldsmobile cars; and a 12½ acre central parts distribution warehouse. Existing production space at Oshawa will be revamped and used primarily for truck production. The Oshawa facilities are expected to raise production capacity of GM of Canada to 1350 vehicles a day.

GM of Canada in the first quarter of this year held 41 per cent of the total car market in that country. In 1952, it became the first Canadian car maker to top production of 200,000 vehicles. Production in 1953 totaled 219,967, a record high. The company at the end of 1953 had 17,173 persons on its employment roll against 16,090 the preceding year.



TWO NEW DEVELOPMENTS FROM CESSNA

Aviation news has been made again by Cessna Aircraft Co. with announcement of the two planes above. At top is the new 620 business aircraft, a prototype of which is expected to fly early next year. Powered by four aircooled, 320-hp, supercharged Continental GSO-526 engines, it will have a special gas turbine-powered air-conditioning and pressurization unit built by AiResearch Mfg. Co. Below is the CH-1 helicopter now undergoing CAA flight tests. The whirlybird employs a single main and conventional tail rotor. It is powered by a supercharged, fan-cooled FSO-470 Continental engine delivering 260 net hp to the transmission.

New Military Vehicle Is Designed by Ford

Ford Motor Co. has unveiled a new type of military utility vehicle in the "Jeep" class. Designed by Ford under a two-year contract with Army Ordnance, the ¼-ton, experimental vehicle has been designated the XM-151. It was developed under the Army's standby program and would be put into immediate production in the event of emergency. Further details are expected to be available later.

Rolls-Royce Develops Jet With High Thrust for Size

Rolls-Royce, Ltd., has announced a new light-weight turbojet engine. The Soar, an axial-flow unit, is said to develop a thrust of 1810 lb although it weights only 267 lb. It is 15¾ in. in diameter and 62¾ in. long.

While disclosure of further information and intended applications is blocked by security considerations, guided missiles and small jet fighters are seen as likely uses for this engine.

News of the AUTOMOTIVE



M-H VEHICLE WILL GO ANYWHERE AT WILL

This unique amphibious vehicle, dubbed the "Rhino", is equally at home on land or in the water. Built by Marmon-Herrington Co., it can negotiate swamps, soft mud, sand, climb 65 per cent grades, or travel down the highway at 45 mph powered by a Ford industrial, six-cyl, 110-hp engine. Power and steering in the water are provided by a Hydrojet, which pumps 1100 gpm from intake and discharges through steel nozzle outlet at stern. Key to the 10,000-lb vehicle's versatility lies in its hemispheroidal wheels, which are divided into watertight compartments for marine operation.

Merger Talks Called Off Between White and Mack

Negotiations for a possible consolidation of White Motor Co. and Mack Trucks, Inc., have foundered. Although both companies had admitted that discussions were being carried on for some time, they now report that talks have terminated.

Earlier, White Motor Co. had verified that it was exploring the possibility of acquiring Mack as part of its long-term diversification plan within the motor truck industry, and indicated that it had formulated a plan that would be of "mutual benefit."



FRENCH OFFERING FOR FOREIGN MARKET

Facel Co. has just placed on the market the "Vega" sports model car as a bid for export trade. Although equipped with a V-8 engine supplied by Chrysler Corp., the rest of the car is entirely of French construction. The four-passenger sedan is offered with either a standard four-speed transmission, built by Pont-a-Mousson Co., or a Chrysler automatic transmission. The engine has a 7.5:1 compression ratio.

"Big Four" Seen in Car Industry in Two Years

The recent approval by Studebaker and Packard stockholders of consolidation between the two companies completed the shrinkage in the industry of nine companies to six within a period of 15 months. Since the future of Kaiser Motors is uncertain, and further consolidation of American Motors Corp. with Studebaker-Packard Corp. appears a likely possibility, the number may be reduced to four within the next year or two.

Integration of products between Studebaker and Packard following consolidation will be almost negligible on 1955 models, and is not expected to reach full fruition until the 1957 models. Meanwhile, however, integration of facilities, personnel, and general overhauling and tightening of the entire operation will go on.

Packard is likely to assume a role as a major supplier for engines, transmissions, perhaps stampings. It is conceivable that the Utramatic drive may be re-engineered to fit smaller cars.

Austin Tests a Gas Turbine With Heat Exchanger in Car

Austin Motor Co. has successfully tested a Sheerline A125 sedan powered by a 125-hp gas turbine. This is believed to be the first turbine-driven British car fitted with a heat exchanger.

The two-shaft engine consists of a three-stage turbine coupled to a two-stage compressor, separate power turbine, and cross-flow heat exchanger. Few other details have been released, and fuel consumption is not known.

Ford, Mercury to Retain Plastic Tops on 1955 Cars

Ford and Mercury plan to continue their plastic top cars in 1955. Ford sold about 12,000 of the Skyliners in the first half of this year, about 16 per cent of its total hardtop production. Sales of Mercury's Sun Valley ran about 10 per cent of total hardtops produced with a total of 6126 units.

AND AVIATION INDUSTRIES



FINE POINTS MEASURED

A new type of "interference" microscope is being used by GM Research Laboratories to measure surface "peaks" and "valleys" ranging from two to 100 millionths of an inch. Although outwardly resembling a conventional microscope, it can measure depth or height of minute detail on surfaces. Above the instrument is a camera for photographing the "interference patterns" used to measure microscopic surface variations.

Willys Dowagiac Plant Goes On Auction This Month

Willys Motors, Inc., will auction off its 50,000 sq ft machining plant in Dowagiac, Mich., on Sept. 21 and 22. The plant, which has become a "surplus" unit as a result of the consolidation of Willys with Kaiser, is one of two operations Kaiser wants to dispose of at present. Kaiser also has been seeking to sell the Willys Maywood, Calif., assembly plant since it started to concentrate its entire production of cars in Ohio recently.

Idled since completion of a contract to build R-1300 aircraft engines, the Dowagiac facilities include the building, machines and machine tools, hand tools and maintenance, repair, and office supplies. The plant has not been used for automotive operations since 1950. Government machinery used in producing the aircraft engines is now being removed from the building.

Since its consolidation with Willys in 1953, Kaiser has disposed of two plants—its main facility at Willow Run, which it sold to General Motors, and a plant in Jackson, Mich., which was purchased by Walker Mfg. Co.

AI TABLOID

Lord Mfg. Co. has moved its New York regional field engineering office to 630 Fifth Ave., New York, N. Y. . . . Greer Hydraulics, Inc., has moved to its new plant and offices at New York International Airport, Jamaica, N. Y. . . . Burg Tool Mfg. Co. has a new home at 15001 S. Figueroa St., Los Angeles, Calif.

* * *

Buckeye Tools Corp. recently dedicated its new plant in Dayton, O. . . . Seiberling Rubber Co. has nearly completed its new plastics plant at Newcomerstown, O.

* * *

AAA Contest Board has sanctioned a 100-mile national championship race, to be held Nov. 14, at Las Vegas, Nevada. Prize money of $10,000 has been offered, and some Indianapolis cars are expected to participate.

* * *

Glidden Co. plans to build a pilot plant in Maryland to produce titanium by a new electrolytic process as well as another facility for turning out titanium dioxide. . . . Titanium Metals Corp. of America has sold furnace designs and plans for melting titanium and titanium-alloy ingots to William Jessop & Sons, Ltd.

* * *

Ford Motor Co. of Canada, Ltd., is celebrating its 50th anniversary this year. . . . Curtis Manufacturing Co. is currently marking its centennial year.

* * *

Piasecki Helicopter Corp. has delivered the first H-21-C helicopter to the Air Force. . . . North American Aviation's TF-86F jet trainer has completed its first test flight.

* * *

New white alloy—copper-manganese-tin—will be shown at National Metals Show by The Malayan Tin Bureau.

Climax Molybdenum Co. has announced plans for a $250,000 expansion program in molybdenum research. . . . Cornell Aeronautical Laboratory is to spend some $1.8 million to modernize its wind tunnel for transonic speed research.

* * *

Enterprise Div. of General Metals Corp. plans to build Diesel power units up to 5000 hp. Largest previous rating was 2700 hp.

* * *

Nuclear Science and Engineering Corp., headquartered in Pittsburgh, Pa., has been formed to advise on industrial applications of nuclear power. . . . Atomic Energy Commission will build a new research atom reactor at Oak Ride, Tenn.

* * *

Lukens Steel Co. has denied rumors that it is considering a merger with another company in steel or any other industry.

* * *

Kaiser Aluminum & Chemical Corp. will build a multi-million dollar aluminum sheet and foil rolling mill on a 2500-acre site near Ravenswood, W. Va. . . . Pittsburgh Plate Glass Co. plans construction of a $34 million plate glass producing plant at Cumberland, Md. . . . Du Pont Co. will erect a $2.5 million laboratory building at Wilmington, Del., for its Electrochemicals and Pigments Dept.

* * *

Bell Telephone Laboratories has announced development of a transistor which will operate at 440 million cycles.

* * *

American Society for Testing Materials will hold a symposium on methods of testing liquefied petroleum gases Sept. 27 and 28 at Statler Hotel, St. Louis, Mo. . . . Michigan State College will hold its annual Industrial Ventilation Conference Feb. 14 to 17.

(*Turn to page* 134, *please*)

News of the AUTOMOTIVE



P & W ENGINES TESTED IN MODIFIED STRATOJET

Shown above is a Boeing B-47 Stratojet bomber specially equipped with Pratt & Whitney J57 outboard engines for high-altitude tests. This particular plane also is utilizing four GE J47-11 turbojets which have a thrust rating of 5200 lb each. Current production models of the swept-wing B-47 use GE J47-25 turbojets with a rated thrust of more than 5800 lb.

Transmission Work Starts At Ford's Livonia Plant

Automatic transmissions have started rolling off the lines at Ford's Livonia, Mich., plant. Built originally for the manufacture of M-48 medium tanks in 1952, the 1½ million sq ft facility will produce the Ford-O-Matic and Merc-O-Matic transmissions, in addition to the new Linc-O-Matic unit for the 1955 Lincolns. It will also supply automatic transmission parts for the company's plant in Cincinnati.

Ford's contract with General Motors for Hydra-Matic transmissions for the Lincoln is expected to expire soon. GM has been supplying the unit to Lincoln for the past three years.

The Livonia plant has been tooling up for automatic transmission work since the last tank was produced there in October, 1953.

AUGUST FORD AND GM PRODUCTION UP OVER JULY

1954 Passenger Car Production

As reported to Automotive Industries by the car factories

	August 1954	July 1954	August 1953	Eight Months 1954	Eight Months 1953
Chrysler	4,391	5,549	6,304	66,773	121,101
De Soto	3,693	4,990	5,697	45,883	94,777
Dodge	10,805	6,999	13,976	85,754	217,677
Plymouth	11,571	32,600	46,332	260,569	457,261
Total—Chrysler Group	30,460	49,738	75,309	458,979	890,816
Ford	120,374	115,549	123,655	985,972	753,260
Lincoln	2,979	2,277	2,511	27,350	34,869
Mercury	17,588	18,533	35,309	189,256	196,554
Total—Ford Group	140,941	136,359	161,475	1,202,578	984,683
Buick	44,276	43,120	48,356	374,438	371,189
Cadillac	11,048	10,651	4,612	83,440	78,663
Chevrolet	133,156	122,120	136,566	1,016,045	1,060,287
Oldsmobile	36,101	38,163	24,390	256,224	257,709
Pontiac	26,090	26,022	31,868	249,717	304,507
Total—G. M. Group	253,671	240,076	245,992	2,021,866	2,062,436
Hudson	3,858	2,866	3,834	21,020	57,488
Nash	3,132	5,010	None	45,457	107,447
Total—American Motors	6,990	7,876	3,834	66,477	164,935
Henry J	.....	.....	90	.....	6,072
Kaiser	.....	30	6	5,409	19,081
Willys	200	438	4,082	8,997	37,196
Total—Kaiser Motors	200	468	4,178	14,406	62,349
Packard	2,627	1,747	4,457	23,928	71,553
Studebaker	1,759	5,343	22,159	21,440	142,619
Total—S-P Corp.	4,386	7,090	26,616	45,368	214,172
Total—All Makes	436,648	441,607	517,404	3,809,674	4,379,391

Agreement at Pressed Metals Brings New Hope to Company

Agreement by employees of Pressed Metals of America, Inc., to take a cut in piece work rates and a 20 per cent reduction in salaries of foremen and supervisors has brought new hope for survival to the company. The employees agreed to the new wage readjustment in the face of a possible liquidation of the company due to a loss of business from automobile manufacturers.

The concession by the union has spurred the company to develop new products to increase its business. The firm also is said to be discussing the possibility of a merger with an unidentified company.

For a time it was uncertain whether the company would be able to stay in business in the wake of loss of work from its two biggest customers, Ford and Chevrolet. The firm had been making front suspension assemblies for the two companies. Liquidation would also have affected the firm's wholly owned subsidiary, Acorn Products Corp., in Warren Township, Mich., and a small experimental plant in Port Huron.

In addition to the downward adjustment in wages, Pressed Metals will trim its office force by about 25 per cent. Further reductions in its hourly rated force are also expected.

Ford Thunderbird Car To Bow in October

Ford definitely will market its Thunderbird sports car this fall. Production has started, and dealers will have public announcements in October. Price is expected to be competitive with the plastic-bodied Chevrolet Corvette.

Chrysler Line to Use Variable Speed Wipers

Electric windshield wipers on the 1955 Chrysler lines are expected to have infinitely variable speeds rather than two fixed speeds as at present. It is also reported that two high-priced cars will switch from vacuum to electric wipers for the first time next year.

AND AVIATION INDUSTRIES

Fairchild and Fokker to Build Turboprop Plane for Airlines

Fairchild Engine & Airplane Corp. is joining forces with the Dutch firm of Fokker to produce a twin-engine turboprop plane. Called the F27 Friendship, the aircraft is intended to serve on short and medium-haul runs of local service airlines.

Deliveries of the new plane, which will use British Rolls-Royce Dart engines, are expected to begin in 1956. Fokker is building prototypes of the plane, but Fairchild will build the units to be sold in the U. S.

New Car Line Planned By One Maker for 1955

One of the Big Three reportedly will add a new car line to its present family for 1955. It will not be a new model in the existing line, since it will have its own individual styling and engine.

Kaiser Union Is Given Franchise to Sell Cars

Union officials of Kaiser Motors Corp., whose proposal to set up a car distributorship in Toledo was turned down by the Kaiser management several weeks ago, have now been granted a franchise for a dealership. The corporation has agreed to let the union local occupy the showroom in one of its plants formerly used by L. G. Worman, Ohio distributor for Willys and Kaiser products, whom the union originally planned to buy out.

To be known as Toledo Kaiser-Willys Co., the dealership's biggest activity will be the sale of cars to K-W employes. The firm will be capitalized at $50,000, but the union hopes to obtain additional capital by selling stock to local residents at $100 a share.

Union funds reportedly are not being used for the new operation. Under its previous plans for a distributorship, the union had offered $300,000 from its funds to put the dealership in business.

Kaiser management, while in favor of the union's earlier plans for a wholesale distributorship, declined the

(*Turn page, please*)

GERMAN DWARF

This two-seater Hoffmann car, made by a German motorcycle firm, reportedly is going into volume production soon. The vehicle has a two-cyl, 12.5 hp engine and weighs only 726 lb. Retail price will be in the neighborhood of $690.



United Press

ITALIAN SEDAN

Ready for the road is the Vignale salon car with the Ferrari 166 Millemiglia chassis. The trim vehicle has a V-12 engine with a bore of 60 mm and stroke of 58.8 mm. Compression ratio is 9.5:1, and maximum output is 160 bhp at 7200 rpm.



SEVEN MONTHS SALES OFF HALF MILLION FROM LAST YEAR

1954 U. S. Motor Vehicle Factory Sales*

	Passenger Cars	Trucks	Buses	Totals 1954	Totals 1953
January	454,562	96,167	405	551,134	564,470
February	446,676	87,141	328	534,145	582,200
March	531,529	101,177	297	633,003	700,439
April	534,667	96,723	379	631,769	722,675
May	497,062	91,226	274	588,562	642,732
June	507,055	91,470	351	598,876	660,131
July	451,663	78,507	246	530,416	702,699
Total—Seven Months	3,423,214	642,411	2,280	4,067,905	4,574,946

1954 U. S. Motor Truck Factory Sales By GVW*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	45,560	17,492	3,608	17,735	3,658	4,890	3,224	96,167
February	39,373	16,210	3,207	15,656	3,973	5,572	3,150	87,141
March	45,588	18,841	3,719	19,446	4,473	5,496	3,614	101,177
April	43,187	18,023	3,755	18,996	4,146	5,264	3,352	96,723
May	41,950	16,895	3,329	16,956	3,950	4,733	3,411	91,226
June	42,786	15,936	3,464	18,021	4,401	3,801	3,061	91,470
July	37,470	13,568	3,289	15,714	3,103	2,430	2,943	78,507
Total—7 Mos. 1954	295,914	116,955	24,371	122,526	27,704	32,186	22,755	642,411
Total—7 Mos. 1953	342,228	137,211	29,398	112,854	32,645	99,132	28,892	742,360

*—Automobile Manufacturers Association.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES



COMPACT BUS

The small bus body shown here was designed by Utility Truck Distributors, Inc., to meet industrial, institutional, and business needs for a low-cost bus. Intended to carry 15 to 20 persons, it is available in both 10 and 12-ft lengths.

offer. It was believed that the company's decision then was based in part on the belief that the union lacked the experience to sell automobiles.

Plastic Roof Is Installed On President's Parade Car

A specially-built plexiglass roof has been installed on President Eisenhower's parade car. Designed to give onlookers a better view of the President, it covers the rear passenger seat of the black Lincoln touring car which Mr. Eisenhower uses.

Harder, Hautau, Tigges Speak At Iowa Automation Conference

Del S. Harder, manufacturing vice-president of Ford Motor Co., recently lambasted the "prophets of doom" who claim that automation will cause widespread unemployment and labor dislocation.

Speaking Aug. 27 before a conference of executive, production, and technical personnel in Davenport, Ia., Mr. Harder declared that automation will create more jobs, more and better products at a lower cost and enable labor to increase its earning power through higher skills and greater productivity.

Mr. Harder went on to say that the definition of automation needs broadening to include design of parts, methods for manufacturing them, and production control systems. He noted that Ford's original definition described automation as "the automatic handling of parts between progressive production processes."

Another speaker at the one-day affair, Charles Hautau, president of Hautau Engineering Co., Detroit, said in response to questioning: "The automotive industry is now evidencing a frantic desire to assemble things automatically. They are spending huge sums to do this."

Herbert L. Tigges, president of the National Machine Tool Builders Association, presented an interesting talk on "Automation and the Machine Tool Industry." He laid special stress on such trends in machine design as faster tool-cutting motions; advances in electronic and hydraulic controls; and better work-holding devices.

Sponsoring organizations for the conference were: American Society of Mechanical Engineers (Iowa-Illinois section); American Material Handling Society, Inc., Quad City chapter; Quad-City Association of Timestudy Engineers; and Associated Industries of the Quad-Cities.

Hudson Dealers to Offer Nash Rambler Next Year

The Nash Rambler line will be made available to Hudson dealers starting with 1955 models. The Rambler series will be announced separately from other series in both the Hudson and Nash lines. Some Hudson dealers already have been given the Nash Metropolitan line.

Hydraulic Press Studies Offer to Buy Company

A group headed by industrialist Frederick W. Richmond, who reportedly was interested in buying Reo Motors several months ago, has made an offer to purchase Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. Stockholders will study the proposal to buy the company for $4.3 million. Mr. Richmond, 31, is presently the chairman of four machine tool companies.

The group recently purchased Birdsboro Steel Foundry & Machine Co. for $3.9 million and has made an offer to buy Follansbee Steel Corp. for $9 million. Hydraulic Press has three plants located in Mt. Gilead manufacturing molding equipment for the plastics industry, die casting machines, hydraulic presses and components. The company last year had total sales of $15 million.

Thompson Given Contract For Jet Parts Facility

A $1.039 million contract for the construction of a laboratory for testing the jet engine parts it produces for the Navy has been awarded to Thompson Products, Inc. To be located on a 94-acre site near Painesville, O., it will be one of the few such facilities in the country for testing engine components exclusively.

Olds Cites Importance Of Drive-away Programs

The importance of customer driveway departments at car plants is cited by Oldsmobile. During the first seven months of this year, Oldsmobile delivered 9202 new cars to customers at its Lansing, Mich., plant. Most of the buyers were from the far West. The total compares with 10,000 cars delivered under the system during all of 1953.

Many car factories have been setting up larger and more elaborate customers drive-away departments in the past several months. An expanded retail delivery program is being completed now by Olds.

(*Turn to page* 192, *please*)

Men in the News



National Automatic Tool Co.—Kenneth P. Martin has been made general sales manager.



Steel Improvement & Forge Co. — Aubrey H. Milnes was promoted to executive vice-president, and Douglas T. McGinty was named presidential assistant.



Le Roi Co. — Jack E. Heuser has been appointed vice-president in charge of sales.

Chrysler Div., Chrysler Corp.—**Thomas Poirier** is now assistant to the president.

Thompson Products, Inc.—**Ed. P. Riley** was named vice-president in charge of the Accessories and Turbine Drive and Commercial Pump Divs.; **Pierce T. Angell,** manager of the Accessories Div.; **John B. Gates,** manager of the Commercial Pump Div.; **William P. Bente,** manager of the Turbine Drive Div.; **Charles W. Ohly,** vice-president and general manager of Michigan operations. **Matt P. Graham,** who has headed Michigan operations, will continue as a vice-president of the company.

Ingersoll Steel Div., Borg-Warner Corp.—**Harold G. Ingersoll, Jr.,** was elected vice-president and secretary; **Ralph W. Leigh,** vice-president in charge of sales; and **William C. Zepf,** treasurer.

Electric Storage Battery Co.—**Earl W. Williams** and **Edward J. Dwyer** have been elected treasurer and secretary, respectively.

Bryant Chucking Grinder Co., Gage and Spindle Div.—**Joseph E. Smith, Jr.,** has become manager.

Firestone Tire & Rubber Co.—**William D. Gohr** has been appointed director of defense activities.

Niagara Machine & Tool Works—**Clifford R. Boeckler** has been made district manager of the new Western New York Territory office.

Temco Aircraft Corp.—**Robert L. Lewis** has been named assistant director of contract administration.

Pennsylvania Salt Mfg. Co.—**George W. Benbury** has been promoted to assistant general purchasing agent.

Westinghouse Electric Corp., Micarta Div.—**S. F. Davies** has been appointed sales manager, and **C. B. Leape** has been named engineering manager.

New Process Gear Corp.—**Robert W. Wolfe** is now chief automotive engineer.

Goodyear Tire & Rubber Co.—**G. A. Hudson** is now manager of truck tire sales.

Lincoln-Mercury Div., Ford Motor Co.—**Paul E. Essick** is now manager of the Lincoln Sales Dept. of the Philadelphia district.

Shatterproof Glass Corp.—**Herbert F. Webster** was made advertising manager.

Convair Div., General Dynamics Corp.—**A. W. Morgan** has become assistant to the manager of the San Diego plant.

Lockheed Aircraft Corp., Georgia Div.—**Robert F. Stoessel** has been chosen manager of the Sales Engineering Dept.

Bell Aircraft Corp.—**William R. Fuller** was made manager of personnel operations for the Niagara Frontier plants.

Sintercast Corp. of America—**Robert E. W. Harrison** is now director of special engineering projects.

Landers Corp.—**John C. Siegmann** has been elected secretary and treasurer.

J. H. Williams & Co.—**Dale Bethke** was chosen sales representative for Michigan.

Chrysler Corp.—**Hugh S. Cole** is now supervisor of television services, while **John L. Beers** is handling merchandising and promotion in the Advertising Services Dept.

Prutton Corp.—**D. H. Prutton** has become board chairman, and **Howard D. Prutton** succeeds him as president.

(*Turn to page* 204, *please*)

Necrology

William H. Taylor, 58, chief production engineer for Kelsey-Hayes Wheel Co., died Aug. 22, at Detroit, Mich.

Carl L. Anderson, 73, former executive superintendent of Mechanics Universal Joint Div., Borg-Warner Corp., died Aug. 25, at Rockford, Ill.

William Powell, 40, chairman of the Indianapolis Motor Speedway technical committee, was killed in an automobile accident Aug. 26, at Crystal Lake, Ill.

Harry S. Malone, 63, former production manager for Delco Div. of General Motors Corp., died Aug. 17, at Dayton, O.

Lewis A. Larsen, 79, a founder and former president of Superior Coach Corp., died Aug. 25, at Lima, O.

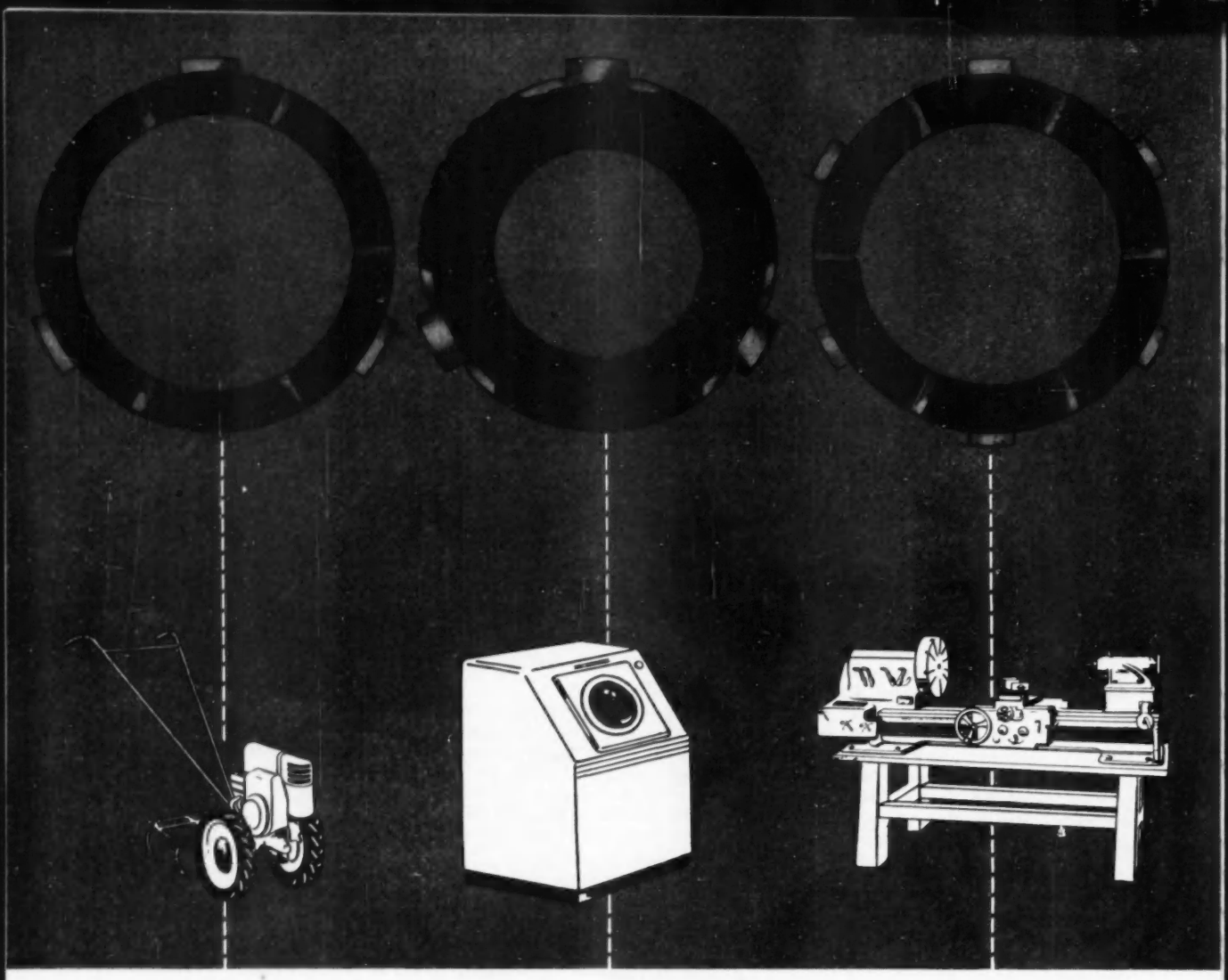
Angus C. Woodbridge, 88, pioneer automobile body designer, died Aug. 18, at Detroit, Mich.

George W. Pontius, III, 44, automotive section manager of Bendix Products Div., Bendix Aviation Corp., died Aug. 18, at South Bend, Ind.

Allen Mulford, 60, a commercial vice-president of International General Electric Co., died Aug. 21, at New York, N. Y.

Herbert L. Towle, 79, former technical writer for Kingsbury Machine Works, Inc., and one-time associate editor of *The Automobile* magazine, died Aug. 23, at Philadelphia, Pa.

George H. Taber, Jr., 64, a former president of Sinclair Refining Co., died Aug. 20, at Rye, N. Y.



Cork clutch facings are used in a wide variety of appliances and power equipment. Cork's high torque capacity at low engagement pressures often permits marked savings in clutch design.

CORK CLUTCH FACINGS:

Dependable performance for appliances and power equipment

Many manufacturers of appliances and other power equipment are getting efficient and dependable clutch performance from cork-compounded friction materials.

Cork's unusually high coefficient of friction makes it possible to transmit a given amount of torque with fewer or smaller plates. And the wide range of available cork friction compositions enables designers to get just the engagement characteristics and torque capacity they need for specific problems.

In wet clutch applications, cork's high torque capacity normally makes it possible to reduce the number of friction facings—or to use smaller plates—or to reduce engagement pressures, and still maintain the desired torque capacity. In such cases, the saving in material, metal, fabrication, and assembly can be substantial.

A good example of this is the experience of a manufacturer of automatic washers. By using cork composition, this manufacturer was able to reduce the number of friction facings from eight to three. But the real economy is in the service these facings give. They last the life of the appliance, eliminating expensive field maintenance.

If you're designing clutches for appliances, business machines, industrial equipment, or the automotive field, there's a good chance that cork's dependable performance and long life can help you. We'll gladly work with you in choosing the most efficient cork facing for your use. Write Armstrong Cork Company, Industrial Div., 7209 Imperial Ave., Lancaster, Pa.

ARMSTRONG'S FRICTION MATERIALS



*consistent quality

is as important in the pin as in the gear

To function effectively, a spring pin must drive easily into holes drilled to normal production tolerances, compressing as driven. To drive easily, hold firmly and fit flush, the pin —*every* pin—must meet the strict requirements of specifications such as those prepared by the SAE and the Military Services.



Since failure of a pin can be as costly as a failure of any other precision part, it is important to check the pins *you* buy for uniformity . . . uniformity of diameter and length, shear strength, hardness, insertion and removal forces, and recovery of diameter.

Rollpin has been tested many times—by many manufacturers—with a consistently high performance record. It has been widely recognized as the "quality" fastener of its type. In this case, quality can be—and should be—measured. We strongly urge that you test for quality when buying spring pins.



ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R28-95, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

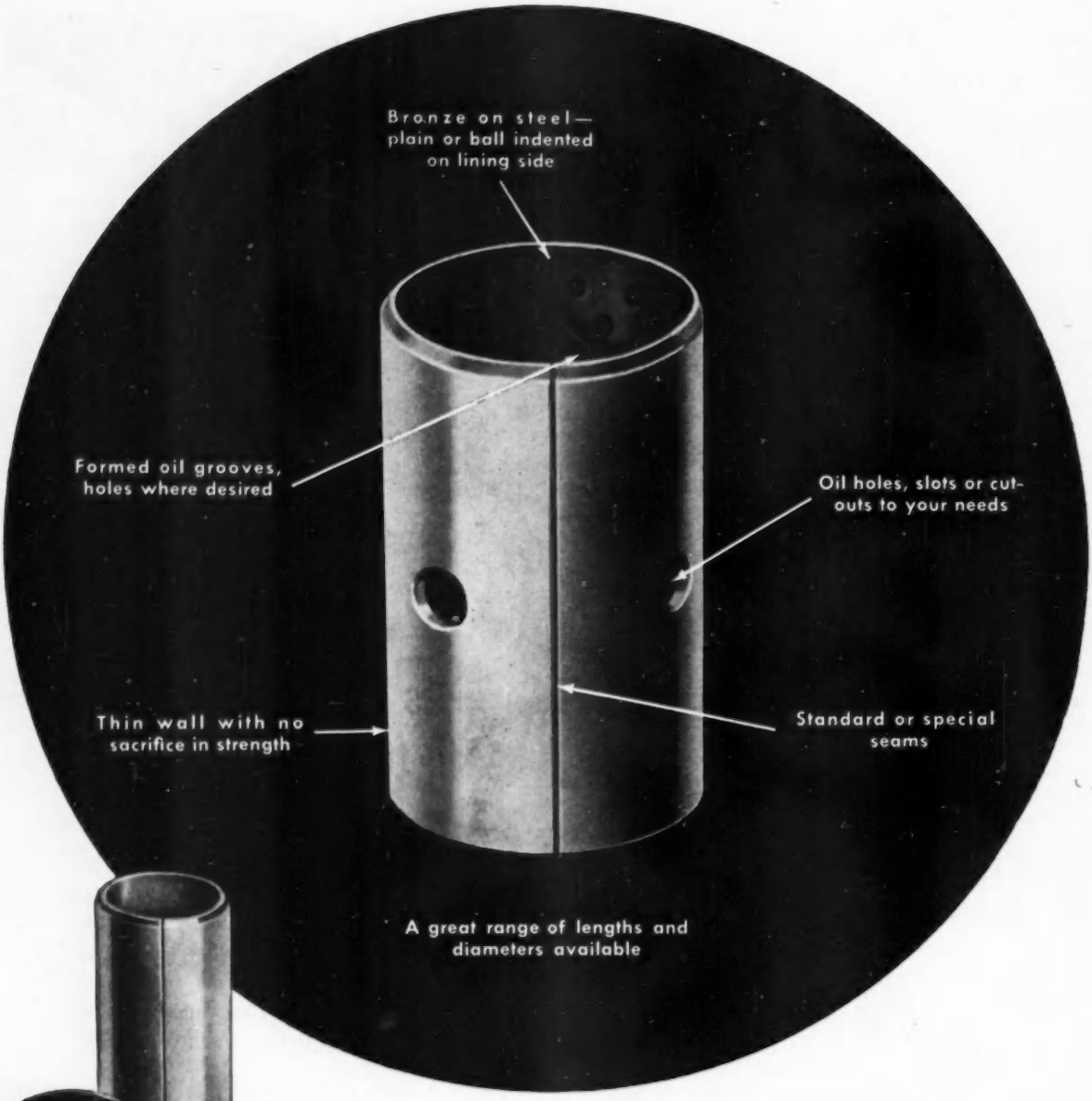
- ☐ Rollpin samples
- ☐ Rollpin bulletin
- ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

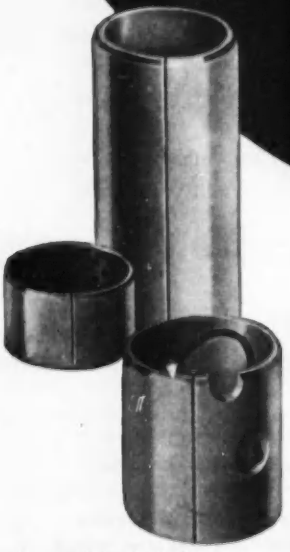
Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____





Also available in tin-base or lead-base babbitt on steel.

Get bearing performance at bushing cost. Save material, time and labor with Federal-Mogul bimetal rolled split bushings. Quality production in large volume runs for hundreds of uses can mean savings in *your* application.

FEDERAL-MOGUL CORPORATION, 11037 Shoemaker, DETROIT 13, MICHIGAN

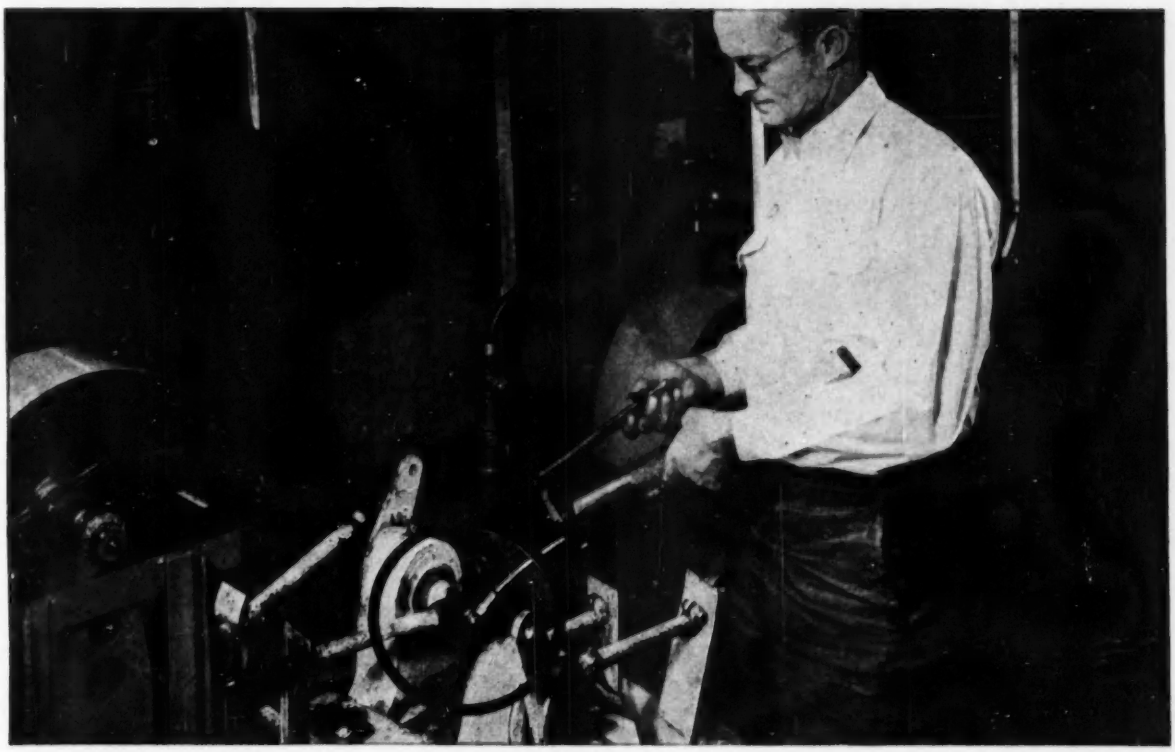
FEDERAL Mogul since 1899

FEDERAL-MOGUL

Sleeve bearings in all designs and sizes; cast bronze bushings; bimetal rolled bushings; rolled split bushings; washers, spacer tubes, precision bronze parts and bronze bars.

You can count on

Thompson's Performance-Tested steering linkage



THIS "CAR" TRAVELS 1500 MILES A DAY!

IT'S not a *whole* car, of course. Just the important center link of a Thompson precision-made steering linkage. In the above picture, the center link is getting its daily... yes, *daily*... 1500-mile lubrication!

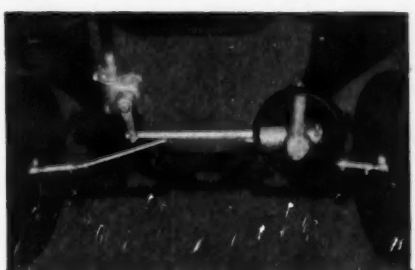
AROUND THE CLOCK—This is part of a grueling Performance Test that goes on in Thompson's Testing Laboratory 24 hours a day. Here the most extreme, difficult road conditions are duplicated. The Thompson steering link is subjected, hour after hour, day after day, to baths in mud and water . . . dry spells . . . jarring jolts of 300 pounds or more . . . and grinding, burning friction.

And, in addition, these rugged tests are supplemented by actual trial runs out on the road in standard-make cars.

WHY THESE TESTS? Because Thompson is continually striving for *improvement* . . . in materials, in performance, in manufacturing procedures. New materials, new processes, new designs are all subjected to these thorough Performance Tests . . . and always under the most extreme conditions.

THE RESULTS? These exacting tests in the laboratory and out on the open road . . . plus periodic skilled analyses by experienced Thompson engineers . . . result in the finest possible steering linkage for America's cars, trucks, buses and tractors.

If you have a steering linkage problem, let Thompson's steering engineers help you. Just write or phone Thompson Products, Inc., Michigan Plant, 7881 Conant Ave., Detroit 11, Mich., WA 1-5010.

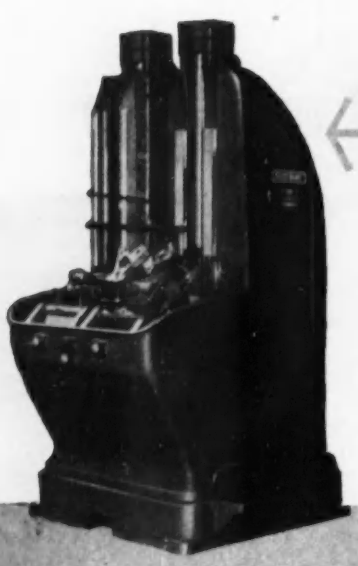


You can count on

Thompson Products

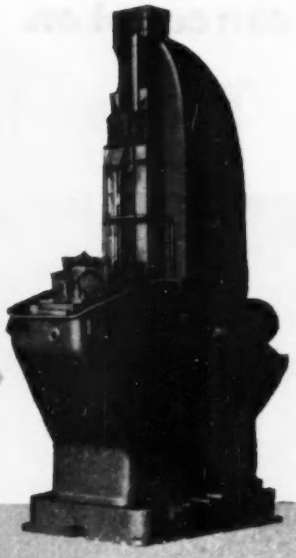
MICHIGAN PLANT

Detroit • Fruitport • Portland



Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

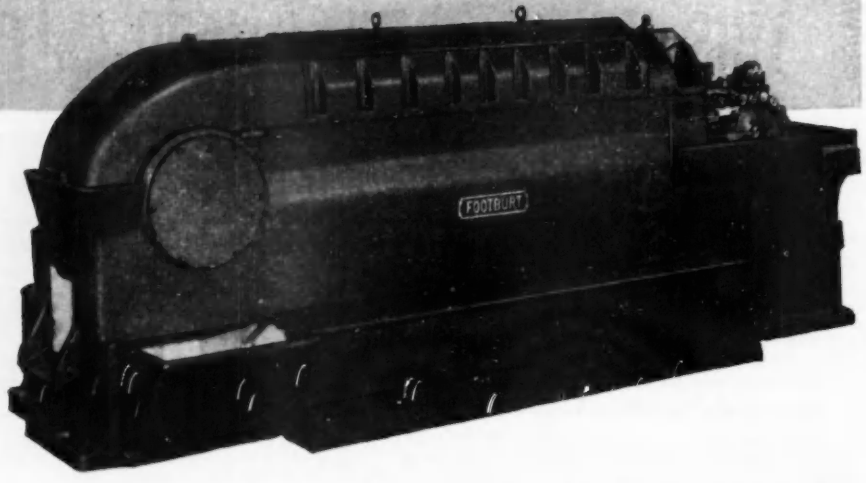


A FASTER *more economical* MACHINING OPERATION

● Footburt Surface Broaching may be the answer to your problem of faster machining. Many jobs that were slow and expensive when handled by conventional machining methods are now being produced by Surface Broaching. Production in most cases is as fast as the speed at which parts can be loaded. Yet cutting speeds are so low that the cost of tool maintenance shows great savings. Exceptional finish can be maintained. We will gladly discuss your machining problems with you.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building

Continuous Type Broaching Machine. Made in 5 Sizes.



FOOTBURT

SURFACE BROACHING

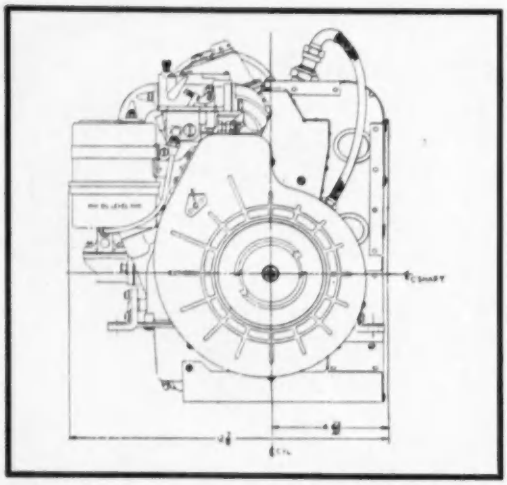

You don't have to look far...
PLYMOUTH
ANN ARBOR
MILWAUKEE
CHICAGO
CORRY
DAYTON
LOS ANGELES
for
GOOD SPRINGS
WALLACE BARNES COMPANY
BRISTOL, CONNECTICUT
THE WILLIAM D. GIBSON COMPANY
1800 CLYBOURN AVE. CHICAGO 14,
RAYMOND Manufacturing COMPANY
CORRY, PENNSYLVANIA
BARNES-GIBSON-RAYMOND
40300 PLYMOUTH RD. PLYMOUTH, MICH.
B-G-R COOK PLANT
ANN ARBOR MICHIGAN
F. N. MANROSS AND SONS CO.
BRISTOL CONNECTICUT
OHIO DIVISION
1825 EAST FIRST ST. DAYTON, OHIO
DUNBAR BROTHERS COMPANY
BRISTOL, CONN.
MILWAUKEE DIVISION
341 E. ERIE ST. MILWAUKEE, WIS.
SEABOARD Coil Spring Div.
15001 S. BROADWAY GARDENA, CALIF.

How Small Engines Are Being Standardized for the Armed Forces

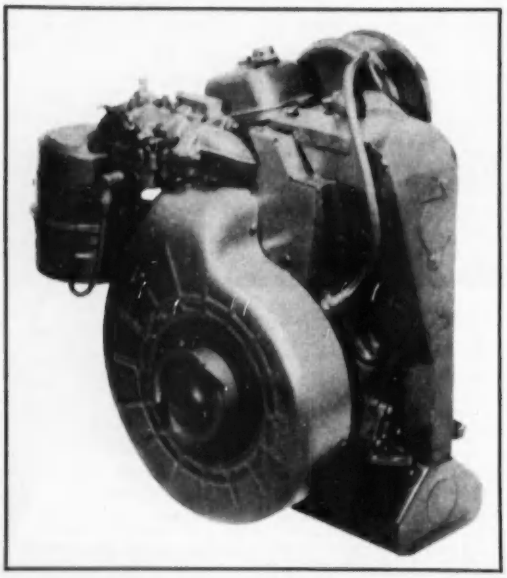
Report Is Here Presented on Development Project Being Conducted by Fort Belvoir Corps of Engineers

By R. W. Beal, Chief, Mech Engrg Dept
R. F. Dennis, Asst Chief, Engine Branch

Engineer Research and Development Laboratories
FORT BELVOIR, VA.



Installation dimensions of starter end of 1½-hp Military engine



Rope starter end of 1½-hp engine

DURING World War II, the Armed Forces used over 340 different makes and models of industrial type gasoline engines. Since each of these engines was made up of at least 300 different component parts, it is evident that the more than 100,000 different parts involved in the maintenance support of these engines presented a tremendous problem. In addition, all industrial type engines used were basically standard commercial products of American industry, and their performance under adverse field conditions and using military fuels and lubricants was generally unsatisfactory, especially in the small sizes. This World War II experience, therefore, very clearly established the need for standardization and improved performance of industrial type gasoline engines.

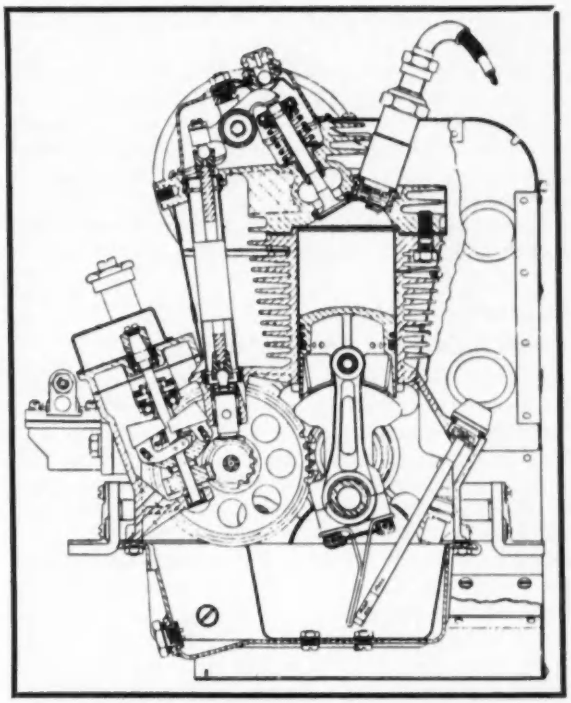
In 1948, the Munitions Board, at the request of the Corps of Engineers, appointed an Industry Advisory Committee for Industrial Engines to study the unsatisfactory engine situation and to recommend courses of action which should be taken by the Department of Defense to improve the situation. After extensive study of the problem, the Advisory Committee arrived at two general conclusions which are pertinent to this article: (1) that a program should be initiated to standardize all high mortality parts used in the intermediate and large sizes of commercial, industrial type gasoline engines, (2) that for the smaller sizes of gasoline engines, this same approach did not appear to offer as much promise for realizing the desired results.

As a result of the first conclusion, the Corps of Engineers, in cooperation with industry, is conducting a program involving the standardization of high mortality parts and accessories for use with standard

commercial engines. The program has progressed to the point where five bore sizes of engines (of a planned total of 12 sizes) with standardized high mortality parts were introduced into the quantity procurement picture in July, 1952, by means of a Qualified Products List (QPL), and the remaining sizes will be introduced this calendar year. To date, approximately 70 engines have been, or are being, qualified. Standardization of accessories for these engines also is underway, and the first standardized accessories will be available for quantity procurement in the near future. When this program is completed, it is expected that the internal and external spare parts for basically standard commercial industrial gasoline engines will have been reduced by 90 to 95 per cent. In some cases the introduction of standard military parts, as for example, valve rotators, has resulted in some increased performance.

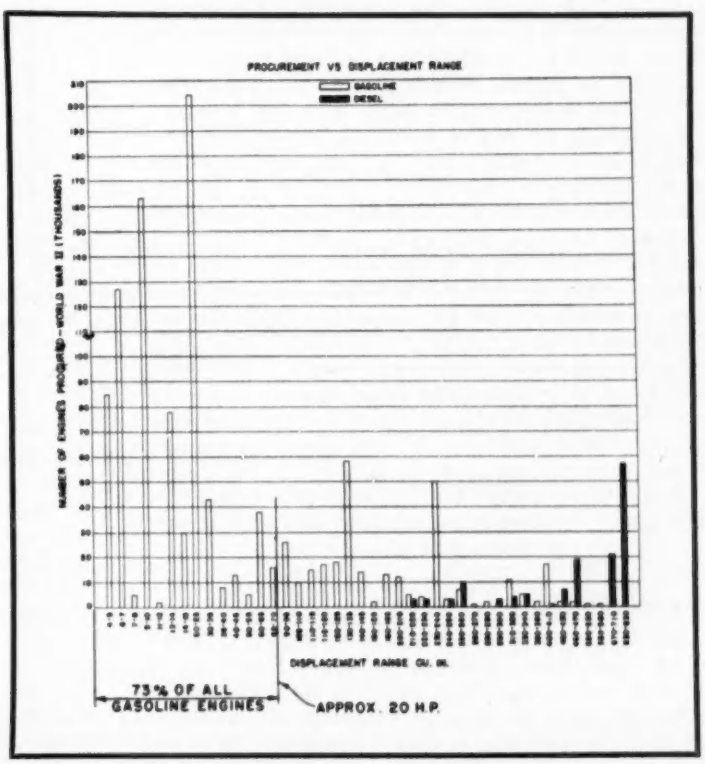
The second conclusion of the Munitions Board Industry Advisory Committee indicated that small gasoline engines were less suitable for this same type of standardization treatment, primarily because of the wide design differences between makes and models, the fact that both two- and four-stroke engines were involved, and that these smaller commercial engines fell far short of meeting military requirements, especially when operating on military fuels and lubricants. Therefore, the Corps of Engineers decided to develop new engines in the small size range. As a matter of interest, of the approximately 340 different makes and models of industrial type gasoline engines used by the Armed Forces in World War II, 78 fell in the ½- to 20-hp size range, and again on the basis of roughly 300 parts per engine, this represented a spare parts supply problem of approximately 23,000 different parts. As further evidence of the extreme importance of these small engines to the Armed Forces, Chart 1 shows the total number of industrial type engines procured in World War II. It can be seen from this chart that approximately 73 per cent of the total number of gasoline engines procured fell in the ½- to 20-hp size range. Actually this 73 per cent represented over 800,000 engines, so that in another emergency we probably should think in terms of millions of these small size engines.

The postwar small industrial engine program of the Corps of Engineers has been carried on in three phases: (1) more than 40 of the better quality small commercial gasoline engines were tested by ERDL for one primary purpose—to determine obtainable performance levels for inclusion in new specifications for the procurement of commercially-produced small engines. This procedure was adopted in an attempt to establish



Cross section view of 1½-hp, four stroke Military engine

Chart 1—Industrial Engines, All Services



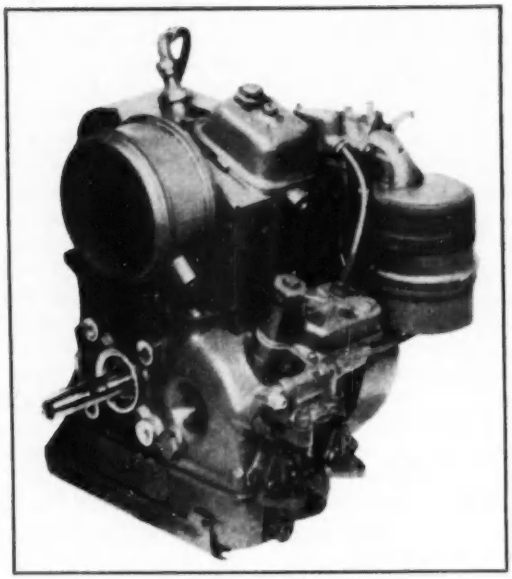
performance levels which would provide the military with engines having improved performance over those used in World War II, (2) some of the engines which performed the best during the above tests were improved still further, but even then the performance was far short of military requirements and no standardization at all was accomplished. Concurrently with phase (2), phase (3) was initiated with the objective of developing a military family of small, air-cooled, gasoline engines to realize the maximum in standardization and greatly improved performance.

Military Small Industrial Engine Family

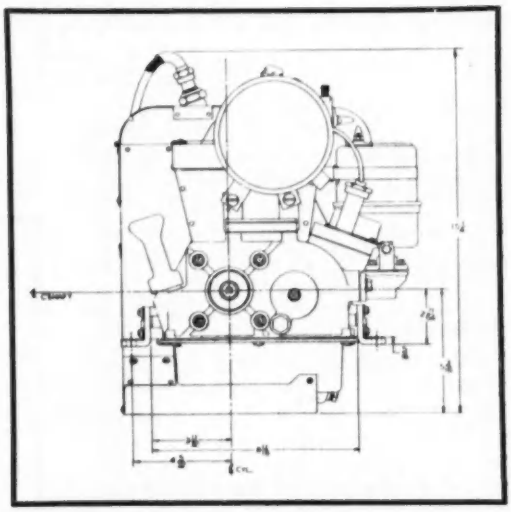
Some of the salient characteristics of the new military small industrial engine family are shown in Chart 2. The family includes seven different size engines in three bore sizes, with some sizes being merely multi-cylinder versions of smaller sizes. Note that information is given for both two-stroke and four-stroke versions. It is this fact that gives rise to the common reference to this program as the "parallel small engine development program." The word "parallel" comes from the fact that both two-stroke and four-stroke engine developments are being carried on concurrently in an effort to exploit all of the advantages of each before a selection of one is made for the final military design. From its inception this program has been shaped to meet the requirments of engine generator service, since the electric generator is the greatest single application for these sizes of engines. Therefore, the rated speed of these engines has been establishd as 3600 rpm and the horsepower size groups were selected to be compatible with required generator sizes. However, these engines are definitely being developed as general purpose power units, but on the basis that if they satisfactorily meet the stringent requirements for engine generator service they also will be quite adequate for other applications within their horsepower capabilities. The design life between major overhauls is 1500 hours, whereas we feel fortunate to reach 500 hours life with commercial engines in these sizes. In this connection, it is interesting to note that competition in the commercial small engine field is so keen for the large volume applications such as lawn mowers and garden tractors that some engines have a commercial design life of only 100 hours, as contrasted to our *minimum* demand of 1500 hours for military use. Market surveys have indicated that a 100-hour life will serve the average home owner for lawn mower service for five years, and the highly competitive market will not bear the expense of building more life into this type engine for the average commercial use.

Development Approach

It was not considered desirable to initiate development of all seven engines in the family concurrently, since it was thought that many of the basic determinations could be made by experimenting with one or two sizes and thereby preclude duplication of mistakes and/or unsatisfactory approaches. With this in mind, an analysis of the proposed family sizes shown on Chart 2 resulted in dividing the family of seven into two subgroups as indicated, with the ½-, 1½-, and 3-hp sizes in one group and the 6-, 10-, 15-, and 20-hp sizes in the second group. Then the 1½-hp size was selected as the "guinea pig" for the three smaller sizes and similarly the 10-hp size was selected for the four larger sizes. In other words, the study indicated that the results of the basic investigations and design studies on the 1½-hp size should be applicable to the ½- and 3-hp sizes without the necessity of repeating



Drive end of 1½-hp engine



Installation dimensions of drive end of 1½-hp military engine

ITEM [2]	SIZE GROUP CONT HP [3]	RATED SPEED RPM	OPERATING SPEED RANGE RPM	DISPLACEMENT (CU IN.) 2-CYCLE	DISPLACEMENT (CU IN.) 4-CYCLE	NO OF CYL.	BORE [4] (IN) 2-CYCLE	BORE [4] (IN) 4-CYCLE	STROKE (IN) 2-CYCLE	STROKE (IN) 4-CYCLE	BORE-STROKE RATIO	PISTON SPEED (FT/MIN)	CUBIC-INCHES PER HORSEPOWER	LIFE BETWEEN OVERHAULS (HOURS)	APPROXIMATE WEIGHT (LBS)	SIZE GENERATOR FOR WHICH SUITABLE - KW
1	1/2	3600	2800-4000	3.31	3.00	1	1-1/2	1-3/4	1-7/8	1-1/4	1.40 0.80	750 1125	6.00 6.62	1500	10	0.15
2	1-1/2	3600	2800-4000	6.28	7.05	1	2	2-1/4	2	2	1.13 1.00	1200 1200	5.50 4.19	1500	25	0.50
3	3	3600	2800-4000	12.56	15.90	2	2	2-1/4	2	2	1.13 1.00	1200 1200	5.50 4.19	1500	40	1.5
4	6	3600	2000-4000	31.18	32.49	2	2-3/4	2-7/8	2-1/2	2-5/8	1.15 1.08	1500 1375	5.42 5.20	1500	90	3
5	10	3600	2000-4000	54.15	58.90	2	2-3/4	2-7/8	3 2-7/8		0.96 0.88	1800 1725	3.89 3.42	1500	90	5
6	15	3600	2000-4000	82.36	84.98	4	2-3/4	2-7/8	2-5/8	2-1/2	1.15 1.05	1800 1575	4.33 4.16	1500	150	7.5
7	20	3600	2000-4000	108.30	77.80	4	2-3/4	2-7/8	2-7/8	3	0.96 0.88	1800 1725	3.89 3.42	1500	200	10

(1) DEVELOPMENT WILL BE BASED ON THE USE OF INDUSTRY'S PRESENT MAJOR MACHINE TOOLS AND EQUIPMENT.
(2) ITEMS 1 THRU 7 WILL USE A MAXIMUM OF IDENTICAL ACCESSORIES AND OTHER PARTS.
(3) ENGINE RATINGS ARE BASED ON NET CONTINUOUS HP OUTPUT OF THE ENGINE FOR NOT LESS THAN THE PRESCRIBED LIFE, AND PROVIDE RATED OUTPUT AT AN ELEVATION OF 5000 FEET AND AN AMBIENT OF 107°F.
(4) ITEMS 2 AND 3 WILL HAVE SAME BORE AND STROKE. ITEMS 4 THRU 7 WILL HAVE SAME BORE BUT ITEMS 5 AND 7 WILL HAVE LONGER STROKE THAN ITEMS 4 AND 6.

Chart 2—Proposed Military Family of Small Aircooled Gasoline Engines [1]

the work for all three sizes. Therefore, in order to start the program on a modest basis, initial negotiations for a development contract involved the 1½-hp size engine only.

Over 40 companies were requested to submit proposals for undertaking the development of the 1½-hp size engine as the first member in the family of seven. From all of the companies contacted, only seven valid proposals were received, and after considerable negotiations the award of the development contract was finally made to Continental Motors Corp. in February, 1952.

Although the initial contract involved only the 1½-hp size engine, it was decided at this stage to adopt a general development procedure to be followed in the development of the entire family of engines. Accordingly, the work on each engine was to progress through four basic phases:

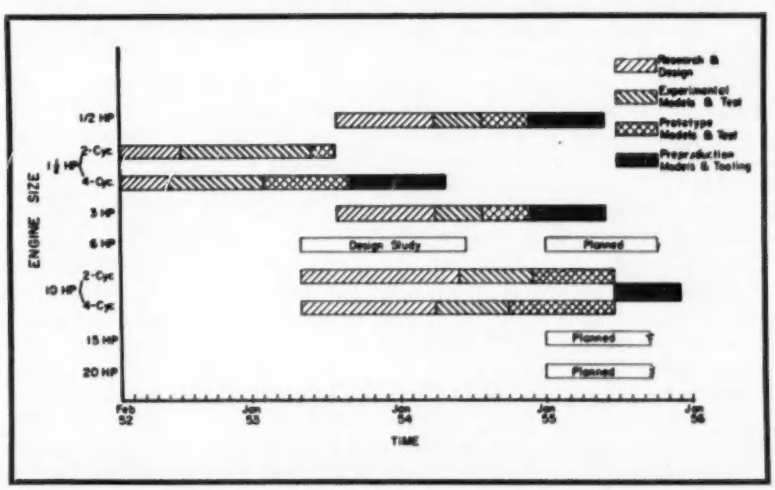
1. Research and Design.
2. Experimental Models—Fabricated in tool room; laboratory tested.
3. Prototype Models—Fabricated in tool room; laboratory tested.
4. Preproduction Models—Fabricated on production type tooling; tested in complete end items.

It was considered that the research and design phase for the 1½- and 10-hp sizes would be much more complete than would be necessary for the remaining sizes, which would in turn utilize the basic determinations made on these two sizes. Therefore, development of the 1½-hp size was to be followed, under a modification to the contract, by the development of the 10-hp size through phase three above, i.e., the completion of the tests of the prototype models in both the two-stroke and four-stroke versions. At this stage in each case a selection of cycle was to be made and the development of the remaining sizes in each of the two subgroups would be based on the work done to that point on the two "guinea pig" sizes of engines.

The preproduction models were to be given only limited performance tests before being applied to various types of end items as a check on their overall

(*Turn to page* 122, *please*)

Chart 3—Status of Long Range Small Industrial Engine Program





Michigan tractor shovels coming off the assembly line at Clark's Buchanan, Mich. They will eventually be produced in Clark's new plant now under construction on the outskirts of Benton Harbor, Mich.

Power Train of Tractor Shovel Has Special Transmission With Constant Mesh Gears

MANY interesting design features are found in the power train of Clark Equipment Company's tractor shovels which are marketed under the trade name Michigan tractor shovel. These machines are made in six models ranging in capacity from 15 cu ft to 2¼ cu yd.

The torque converter for the power train is a Schneider-licensed heavy-duty industrial type unit, developed to withstand the heavy shock loads to which it would be subjected. It is a two-stage, three-member torque converter with a three-to-one multiplication factor, and is gear driven from the engine flywheel.

Four speeds are provided by a two-speed-range transmission, with power shifting from low to high in each range. The result is that the tractor shovel operator has two working (four mph and eight mph) and two travel (13 mph and 26 mph) speeds, forward and reverse. Mechanical shifting is provided from low to high range. With the torque converter, the machine can be started in either the working or the travel speed range.

The transmission has four multiple-disk clutches; one for forward movement, one for reverse, one for first-and-third speeds and one for second-and-fourth speeds. Since all of the clutches are essentially the same, the design and operation of the forward clutch will be described as an example. It consists of metal disks, approximately seven inches in diameter. The "outer" disks are steel and the alternate "inner" disks are sintered bronze faced. While the disks can move together laterally, they are separately mounted for rotary motion. The bronze-faced disks are mounted on an adapter block which is splined to a shaft—in this case the input shaft. The steel disks are mounted inside a drum-sleeve-gear assembly which is bearing-mounted on the shaft. Details of the clutch assembly and mounting are shown in Fig. 1.

The drum-sleeve-gear assembly is ground internally at one end and acts as a cylinder for a hydraulically-actuated piston. When pressure is applied, the piston forces the disks together, thereby transmitting rotary motion from the shaft to the sleeve gear. When pressure is released, the piston is forced back by springs, allowing the disks to separate. The inner disks will continue to rotate with the shaft to which they are splined. Since the drum-sleeve-gear assembly in which the outer plates are mounted is on bearings, the sleeve gear rides freely on the shaft.

Clutches are on the outside of the transmission case. The forward and second-fourth units are on one side

of the case, each covered with a bolted-on cover. The reverse and first-third clutches are on the other side and, because of their proximity, are both housed in the same cover. Each clutch can be checked and serviced by removing the bolts and taking off the cover, without disturbing any other assembly.

The transmission and torque converter are served by the same hydraulic system, which uses type A oil. Oil is circulated by a pump located in the torque converter housing cover. The pump is driven by a shaft which is splined to the engine flywheel and passes through the hollow shaft of the torque converter turbine. This same shaft also drives the tractor shovel hydraulic pump for the bucket actuation.

The multiple-disk clutches are actuated by the two selector levers on the steering column. The levers are connected to a valve in the upper section of the transmission, which directs the oil stream to the selected unit.

An oil diversion system is provided that by-passes the oil from the multiple-disk clutches when the brake is applied. With this arrangement, the tractor shovel operator can hit his brake and "gun" the engine to speed bucket operation.

A regulator valve directs surplus oil to the torque converter and to a cooler located in the lower tank of the tractor shovel radiator. From the cooler the oil is filtered through the bearings and multiple disk clutches in the transmission and then returns to the sump.

As a safety factor, a transmission and torque converter oil supply temperature gage is provided. When the temperature reaches the red line on the gage, it is an indication to the operator to shift to a lower speed range.

There are five shafts in the transmission, as follows: input, reverse, first-third, second-fourth, and output, all of which are mounted on tapered roller bearings. Every shaft except the

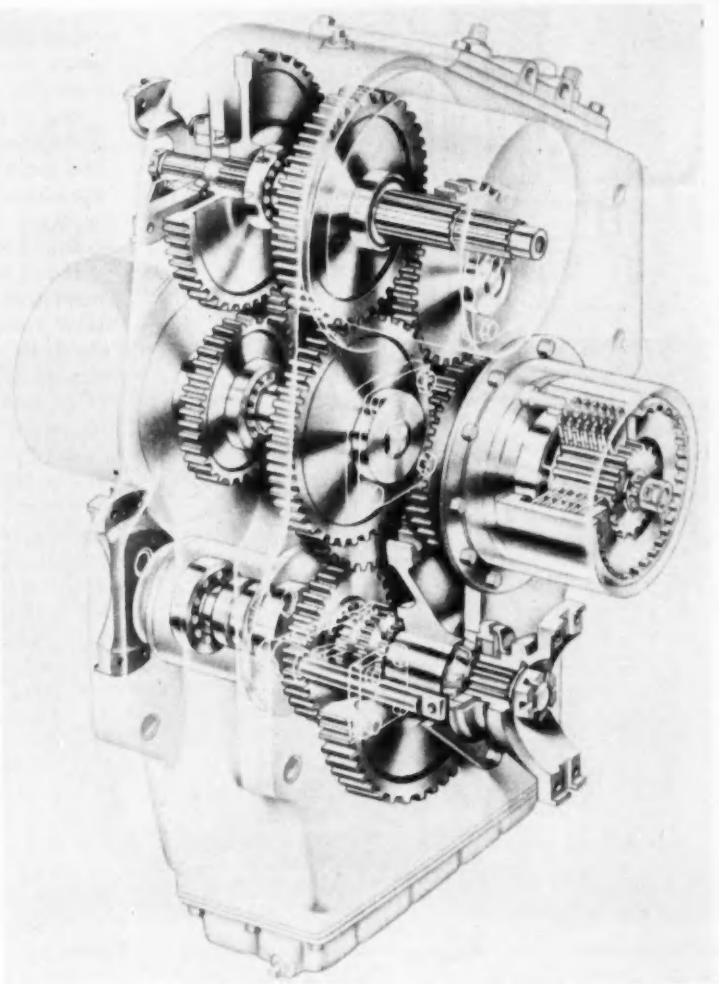
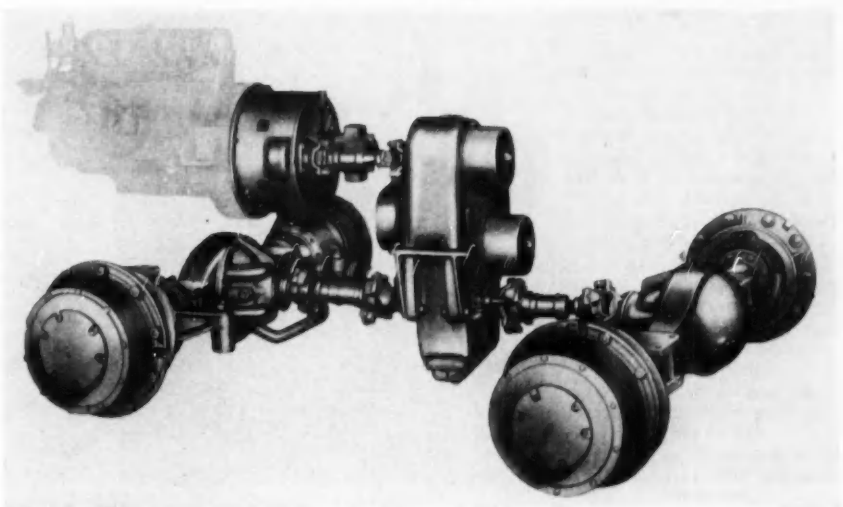


FIG. 1

Part-cutaway, phantom view of the tractor shovel transmission.



General view of power train for the Michigan tractor shovels. The rear axle is at left, torque converter-transmission center front axle, right.

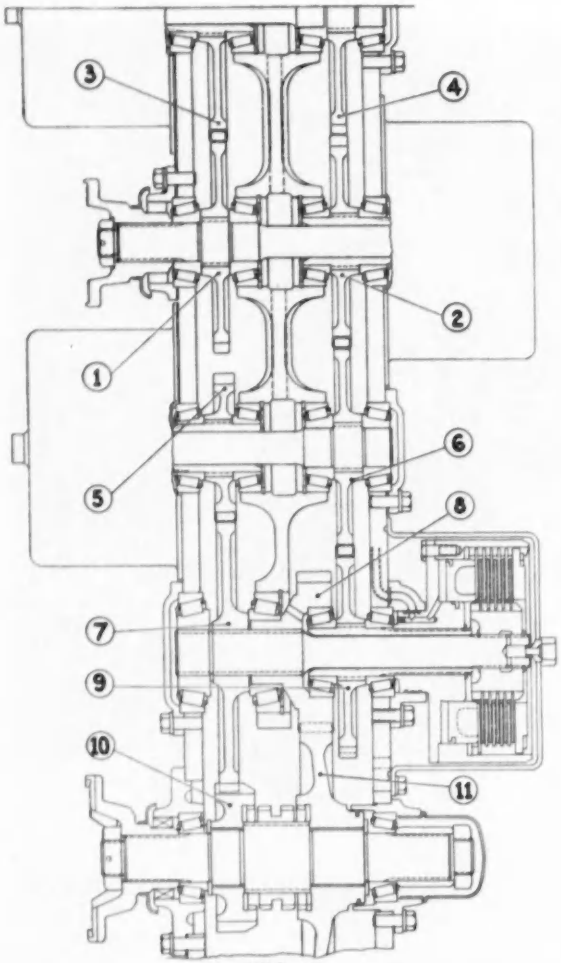


FIG. 2

Arrangement of gears, shafts and clutches in transmission.

1 — Reverse driving gear — splined to input shaft.

2 — Forward sleeve gear — bearing mounted on input shaft.

3 — Reverse sleeve gear — bearing mounted on reverse shaft.

4 — Reverse shaft gear — splined to reverse shaft.

5—First-third sleeve gear — bearing mounted on first-third shaft.

6 — First-third shaft gear — splined to first-third shaft.

7 — High-range second-fourth shaft gear — splined to second-fourth shaft.

8 — Low-range second-fourth shaft gear — splined to second-fourth shaft.

9—Second-fourth sleeve gear —bearing mounted on second-fourth shaft.

10 — High-range gear — mechanically connected to output shaft.

11 — Low range gear — mechanically connected to output shaft.

output shaft has its clutch, and all the shafts have gears which transmit motion from the torque converter to the front and/or rear axles.

One of the outstanding features of the transmission is the constant-mesh gearing, for low and high speeds and forward and reverse movement. Mechanical shifting of gears is limited to change in speed range. The sequence of operation in the transmission can be followed by referring to Fig. 2.

It will be noted that all sleeve gears "float" on their respective shafts and all shaft gears are splined to their respective shafts. Motion is transmitted from sleeve to shaft gear only when hydraulic pressure is applied to actuate a multiple-disk pack. To be operative, the transmission gearing must be connected to either the low or high range gear on the output shaft.

The following gear pairs are always in mesh: 1 and 3, 4 and 6, 2 and 6, 5 and 7, 6 and 9, 7 and 10, 8 and 11.

When the transmission is in neutral, only the input shaft is rotating which means gear No. 1 (reverse driving gear splined to input shaft) and its meshing gear mate No. 3 (reverse sleeve gear bearing mounted on reverse shaft) rotate. By following the gear numbers, each sequence of motion can be followed:

Forward in first (actuate forward pack and first-third clutch)
2-6-5-7-8-11

Reserve in first (actuate reverse pack and first-third clutch)
1-3-4-6-5-7-8-11

Forward in second (actuate forward pack and second-fourth clutch)
2-6-9-8-11

Reverse in second (actuate reverse pack and second-fourth clutch)

(*Turn to page* 114, *please*)

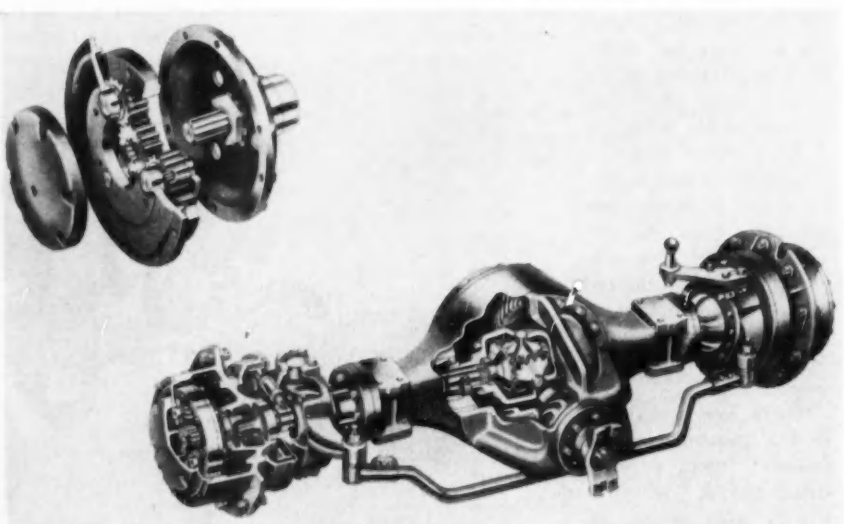
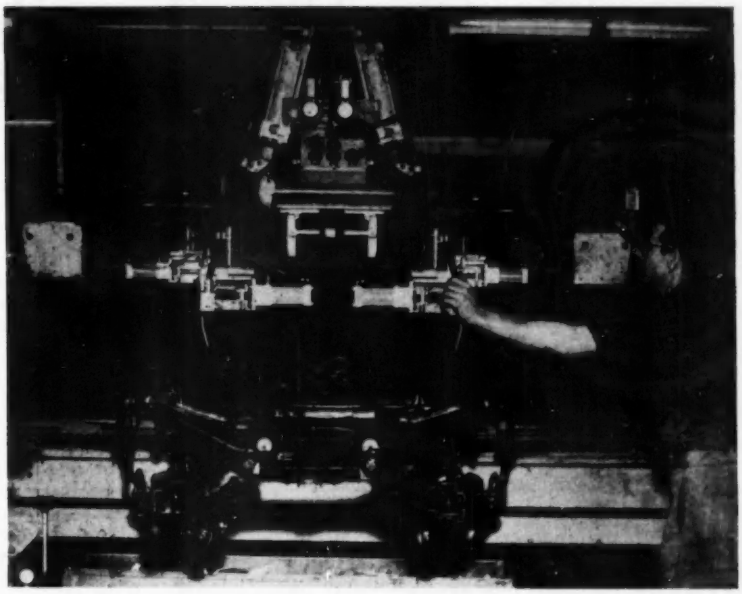


FIG. 3

Cutaway view of axle. Note detail of planetary gearing that provides secondary reduction at the wheels.

Special Device Assures Correct Front End Alignment for Ball Joint Suspensions



Ford's eight arm caster and camber device for ball joint suspension being removed from a completed front suspension.

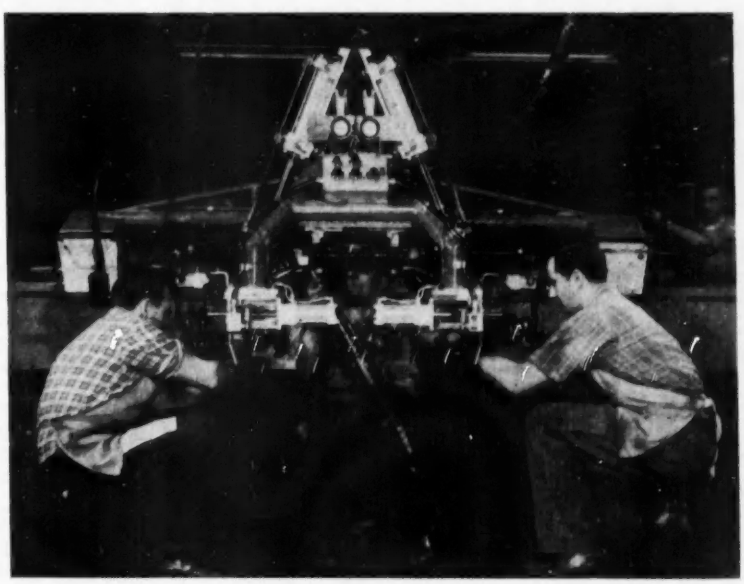
WITH the adoption of ball joint front suspension on Ford Motor Co. automobiles, the company designed a special tool for accurately and rapidly aligning the front wheel spindles during assembly operations. Called the "Octopus" because of its eight arm design, the machine automatically establishes caster and camber.

All of Ford's 20 assembly plants are equipped with at least two of the hydraulic-pneumatic units. The machines were built for Ford by the Superior Machine & Engineering Co.

As the car's chassis frame moves along the assembly line, the front suspension assembly is put in place. The lower control arm is bolted in place, but not run up tight. Then the coil spring is placed in position, but the upper control arm is not attached to the frame. At this point the Octopus is lowered over the front suspension system. During the initial assembly period and the use of the Octopus, the frame is in a bottom-up position.

As the alignment device is moved in place, its rear air cylinders clamp to the outside of the frame, while the front two air cylinders are located and clamp to the inside of the extreme front of the frame. When the unit is thus properly located and clamped, the upper two arms, which are Miller Motor Co. hydraulically operated cylinders, compress the lower control arm and spring assembly. A curb service

(*Turn to page* 112, *please*)



With the Octopus in position, the correct number of shims is determined for the proper caster and camber. Also, with the unit in place, the lower control arm is secured.

Automotive Industry

is key to

Russian Mobilization Plans

THIS installment is part II of the article "Soviet Industrial Planning for Mobilization," Part I of which appeared in the August 15 issue of AUTOMOTIVE INDUSTRIES and described the general industrial pattern of Soviet Russia. Presented here is a summary of the automotive industry which occupies a leading place, in terms of organization and technology within the medium machine building category.

As stated in Part I, this article is based on the report made at the University of North Carolina. The report points out that the automotive industry serves as a huge laboratory in which new methods and technological processes are continually being developed and tested. It uses the very latest technological methods of production, and the most modern plant equipment and measuring and control instruments; it employs the greatest number of qualified personnel of any branch of this category, and applies the latest technical methods and technological processes in the planning of its plants.

Also, in the automotive industry, there is the widest variation in types, character, and specialization of production — from special purpose to mass production. In this industry, plant size ranges from the smallest to the combine.

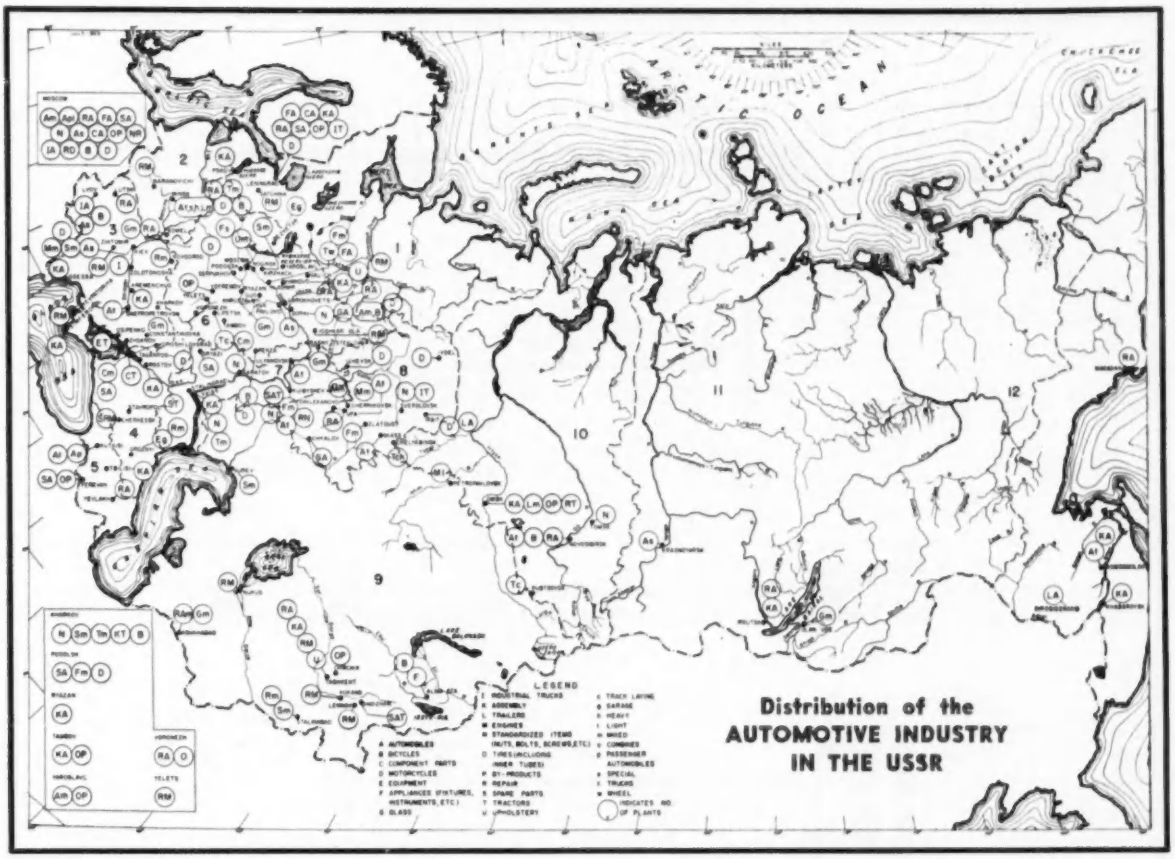
Finally, automotive industry plants maintain the widest relationships with other branches of industry, as well as with plants of other sections of the automotive branch. Hundreds of plants of various other branches supplying the automotive industry with component parts, come under the influence of this industry in matters of organization and technology. The automotive industry has enormous influence on military production.

THE automotive industry (passenger cars, trucks, buses and tractors) is the leading branch of the industrial group of Machine Building in the USSR. The aviation industry and, in part, the aviation engine industry, still give way to the automotive industry in terms of superior organization and coordination of production, and in more efficient use of equipment. Non-automatic, universal machine tools comprise only 1.5 to 5.0 per cent of all machines used in Soviet automotive plants of mass production, and from 25 to 38 per cent of the machines used in automotive shops of series production; the rest of the machines are automatic or semi-automatic.

The Soviet automotive industry uses many standardized items, and employs precision limits of tolerance, which provides for interchangeable parts. In fact, the industry has served as a model for other industries in the development of the system of interchangeable spare parts and of improved methods of repair.

The automotive industry, more than any other industry in the USSR, has been responsible for the creation of intra-branch and inter-plant coordination of enterprises.

Participating in the automotive branch are hundreds of plants of various groups of industry (inter-group coordination). These include plants of ferrous and non-ferrous metallurgy, electric machine building, rubber,



textile, paper, chemical, fuel, light industry, forestry industry, miscellaneous machine building and a number of other industries, as well as plants within each of the above branches.

The number of different kinds of materials necessary for the manufacture of an automobile, for instance, is counted in several thousands. A large proportion of these are processed by the components-producer plants.

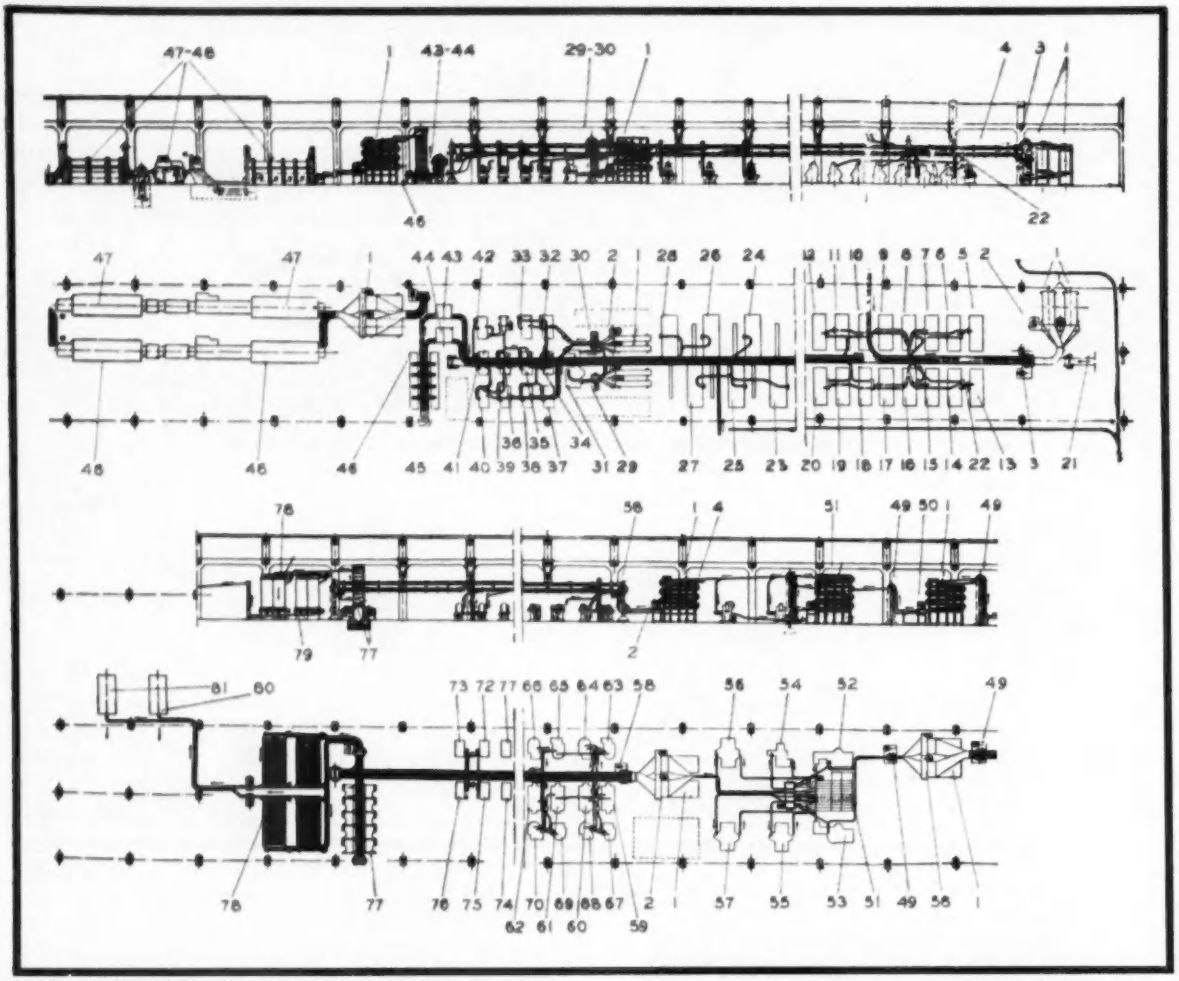
The automobile itself is made up of approximately 3500 separate parts, of which approximately 2500 are usually manufactured by the primary producers themselves, and only about 1000 parts are manufactured by the components-producer plants. When intensive coordination is achieved between the primary producers and the affiliated enterprises (components-producer plants) of the automotive industry, the number of parts and standardized items produced by the latter may be increased to 2500.

The automotive industry is considered the best school for the training of workers in the field of special military machine building, and as an important resource for the development of military machine building and for the production of armaments and military supplies during war time. This is in addition to the normal output by the automotive industry of transport supplies for the military, such as automobiles, trucks, tractors, cross country vehicles, armored cars, motorcycles, bicycles, and other military equipment.

The unit output of the automotive industry in the USSR from 1945 to 1950 may be seen in Table 1. These are the latest figures available.

As compared with the automotive industry in the United States a distinguishing feature of the Soviet automotive industry is the large proportion of trucks that are turned out. The production of trucks amounted to nearly 100 per cent of the total output of passenger automobiles and trucks in 1931, with the proportion gradually diminishing to 90 per cent in 1937, and to about 80 per cent in 1940. The number of trucks planned for production in 1941 equalled about 94 per cent of the total combined planned output of passenger automobiles and trucks. The present ratio of production of trucks to passenger automobiles is estimated at about six to one. In the United States, the 1950 ratio of output of trucks to passenger automobiles was one to five. The explanations for this lie in the need for providing first for the transport of goods in order to alleviate the overloaded railroad system.

A major item, quantitatively, in the Soviet automotive industry has been the yearly increase in the output of bicycles. The number of bicycles produced by the Soviets before World War II ranged from about

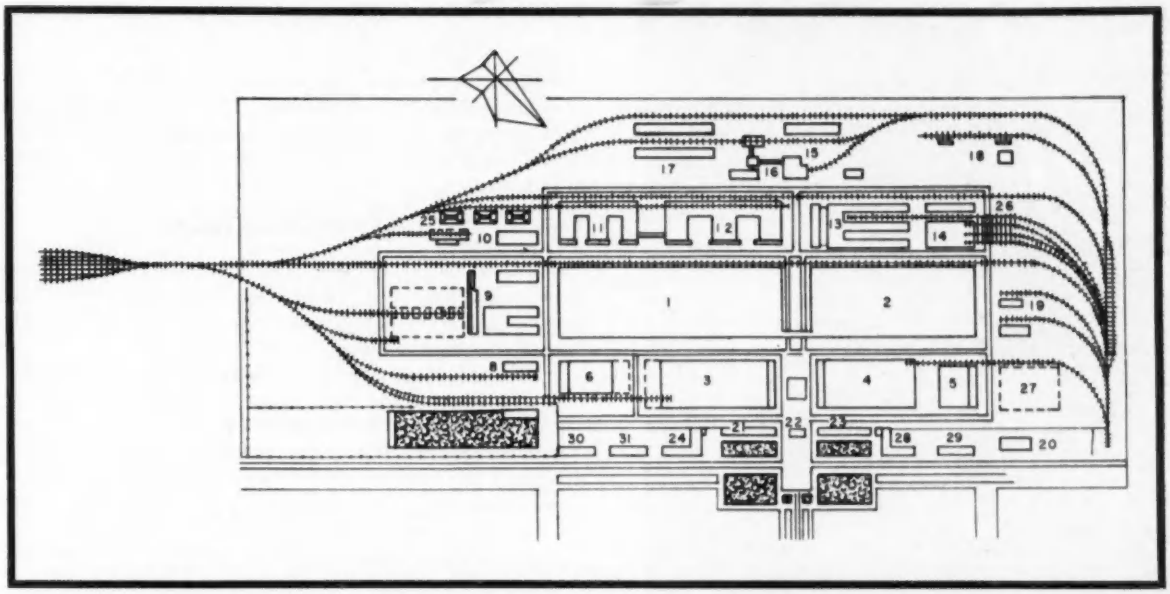


1 Receiver for ball bearing rings
2 Automatic feeder
3 Conveyor motor and gear box
4 Double-chain plate conveyor for the lathe section
5-20 Lathes 21 Feeding conduit
22 Pneumatic hoist to conveyor
23-28 Four-spindle automatic lathes
29-30 Hoists for storage batteries
31 Surface grinder
32-42 Single-spindle automatic finishing lathes
43-44 Brand-stamping presses
45-46 Automatic control panels
47-48 Conveyed parts for heat-treating
49 Conveying hoist 50 Measuring hopper
51 Circular receiver
52-53 Surface grinders
54-57 Centerless grinders
58 Conveyor motor and gear box
59-62 Groove-grinding machine for inner races
63-66 Groove-grinding machine for outer races
67-70 Groove-grinding machine for inner races
71-76 Polishing machines
77 Automatic control panel for sorting races
78 Pre-assembly receiver
79 Conveyor for races from receiver
80-81 Wash apparatus

SETUP FOR AUTOMATIC PRODUCTION OF BALL BEARING RACES

11,000 in 1928 to over 128,000 in 1932 (at the end of the First Five-Year Plan), increasing to 540,000 in 1937 (at the end of the Second Five-Year Plan). In 1940, bicycle production dropped to 229,000. The proposed output goal of bicycles for 1941 was 352,000, but no information is available as to how many were actually produced. The Fourth Five-Year Plan proposed the output of 1,050,000 bicycles, but actual production figures are also not available at this writing. Neither is there any available data on the bicycle output since 1950.

The automotive industry with all its related-producer plants and components-producer enterprises, appears to occupy a relatively important position in the total national economy of the USSR, comprising about four per cent of the volume of the total industrial output, more than 10 per cent of the volume of the total machine building production (civilian and military), approximately 30 per cent of the total



GENERAL PLAN SHOWING LOCATION OF BUILDINGS AND FACILITIES IN AN AUTOMOBILE PLANT

1 Chassis and main assembly conveyor
2 Engines 3 Body pressing
4 Instruments 5 Repair 6 Experimental
7 Expediting and storage of manufactured products
8 Main storeroom 9 Woodworking
10 Models
11 Foundry for wrought iron and non-ferrous casting
12 Foundry for gray cast iron casting
13 Forging
14 Metal storage and make-ready
15 Tests
16 Gas generator station
17 Coal storage
18 Storage of fuel oil and inflammable materials
19 Storage of lubricants and chemicals
20 Garage 21 Administration
22 Mail 23 Laboratory 24 Dining hall
25 Scrap sorting 26 Spring shop
27 Not indicated but assumed to be location for special shop
28 Not indicated but assumed to be medical building
29 Not indicated but assumed to be fire station
30 Not indicated but assumed to be security building
31 Not indicated but assumed to be social-education building

civilian machine building output, and more than 60 per cent of the total output of the Medium Machine Building category.

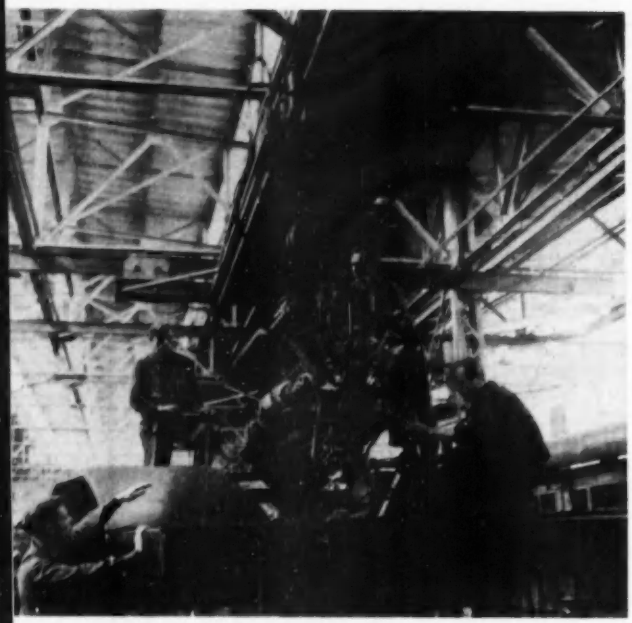
During World War II, virtually the entire automotive industry was mobilized for defense production. The Commissariat for Medium Machine Building was transformed into that for Mortar Munitions, while the Commissariat for Automotive Production supplied the armed forces with light tanks, artillery prime-movers, armored cars, and field artillery.

Administrative Structure

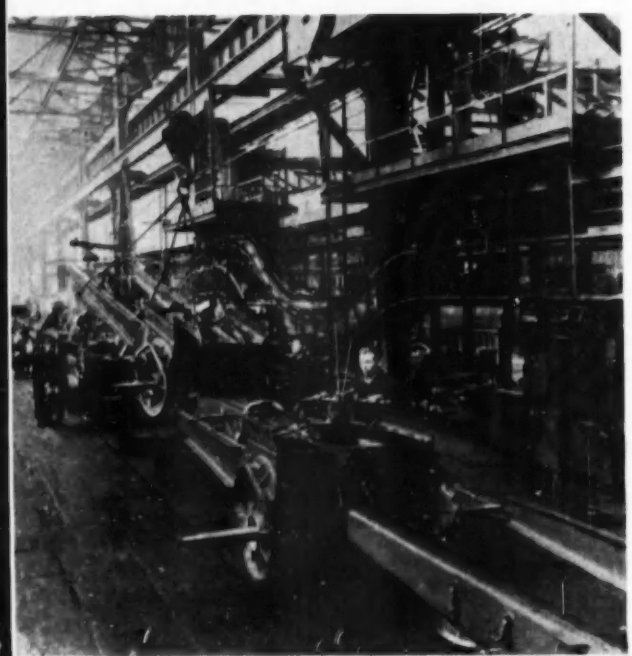
Before World War II and up to 1946, the administration of the entire machine building industry in the USSR was divided among four People's Commissariats: that of Medium Machine Building, of Heavy Machine Building, of General Machine Building, and the People's Commissariat of the Electric Industry. The automotive industry was included in the Medium Machine Building Commissariat to which were subordinated the *Glavki* which were directly responsible for the administration of enterprises of the automotive industry.

Following the general reorganization of the Council of People's Commissariats and renaming it the Council of Ministers on March 15, 1946, the Machine Building Commissariats were also reorganized. From four existing Commissariats, there appeared ten Ministries. Within these Ministries was concentrated the entire civilian machine building industry. However, this setup hardly survived seven years, for on March 7, 1953, by a combined decree of Party and government they were again reorganized, this time into three super Ministries: The Ministry of Machine Building, the Ministry of Transport and Heavy Machine Building, and the Ministry of Electric Stations and Electric Industry. The former Ministries of the Automotive Industry and the Machine Building and Appliances were included, among others, in the newly consolidated Ministry of Machine Building.

However, less than four months later, on June 26, the Council of Ministers and the Presidium of the TsK KPSS issued a combined decree on the organization of



Installing Russia's largest Diesel engine for vehicles in a 25-ton MAZ 525 dump truck at the Minsk Auto Works. This V-12 engine has a piston displacement of 2362 cu in. and develops 300 hp at 1700 rpm.



Assembly line at the Stalin Tractor Plant in Chelyabinsk. The S-80 crawlers on the conveyors will be powered by a four-stroke Diesel rated at 93 hp at 1000 rpm.

a new Ministry of Medium Machine Building. Thus, after two post-World War II reorganizations of the administrative apparatus of the machine building industry, the Soviet government returned to the old structures which existed before, during and after the war, up to 1946, i.e. to the system of four machine building ministries: the Ministry of Machine Building, the Ministry of Medium Machine Building, the Ministry of Transport and Heavy Machine Building, and the Ministry of the Electric Stations and Electric Industry.

CLASSIFICATION

Based on the classification of Soviet industry described in Part I of this article, the automotive branch may be further detailed according to the character of production as follows:

Primary Producers — Primary producers are referred to as those enterprises and plants manufacturing finished commodities which can operate independently, which are the main products of these enterprises, and for which these plants are especially designed.

Secondary or Auxiliary Producers — This type of producer plant concerns itself with finishing processes, assembly or repair.

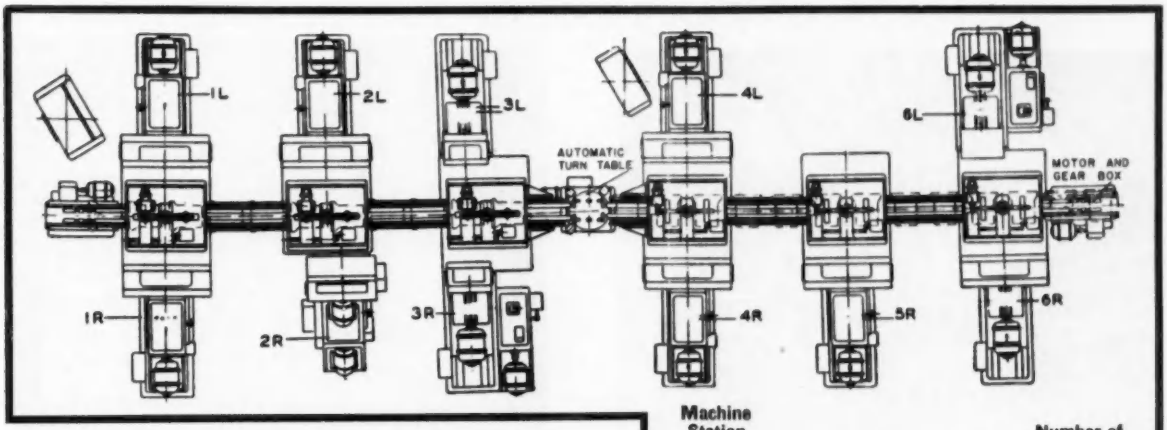
Related Producers — In the automotive industry related producers include the following: Production of truck tractors for van trailers for transport and military purposes; production of automotive trailers for various types; production of auto carts; production of garage equipment (gas and Diesel pumps, air compressors, jacks, lifts, etc.).

Components Producers — Components producers include those plants that manufacture products and spare parts designated for and used by primary and secondary producers only. These products may be specially designed for the automotive industry, or may be of a universal type.

By-Product Producers — By-product producers are concerned with the manufacture of products not directly related to the activities of primary producers. By-products are produced within the plants of primary producers. By-products are usually classified as such because: (1) they may be manufactured from production wastes; (2) they may be produced from parts similar to those used in the manufacture of the primary products; (3) they may be produced by production techniques and technological processes similar to those used in the production of the primary products. In the last instance, by-product production is sometimes temporarily separated from primary production as an independent plant. Examples of by-product production in the automotive industry are production of household refrigeration, and production of household appliances (irons, ranges, electric heaters, etc.).

All plants of the primary-producers included within the automotive industry are administered by the corresponding *Glavki* such as the Chief Administration of Automobile Production, the Chief Administration of Tractor Production, etc.

Secondary-producer plants of the automotive industry are subordinated to the same *Glavki* and Ministries as the primary-producer plants, with the exception of the small repair plants. Some of the automotive repair plants are included within the administrative structure of the Ministry of Automobile Transport of



Transfer machine for truck engine cylinder blocks. It is powered by 17 electric motors and has a production rate of 30 units per hour. Electric current required by the motors is 55.7 kw. Total number of spindles is 139.

Machine Station Number	Equipment	Number of Spindles
1L	Horizontal Drill	21
1R	Horizontal Drill	20
2L	Horizontal Grinder	2
2R	Inclined Drill and Grinder	2
3L	Horizontal Cutter	10
3R	Horizontal Cutter	8
4L	Horizontal Drill	21
4R	Horizontal Drill	22
5R	Horizontal Drill	10
6L	Horizontal Cutter	8
6R	Horizontal Cutter	15

the various Union Republics; others are subordinated to the Ministry of Agriculture, while still others, to the Ministries of local industries. Plants of related producers are subordinated to the corresponding *Glavki* under the Ministries of Medium, General and Transport Machine Building.

Components-producer plants may operate under various *Glavki* and Ministries within and without the machine building industry.

In summary, it can be seen that all plants taking part in the production and repair of automobiles, tractors, motorcycles, bicycles, and related products are under various corresponding *Glavki*, depending upon the type, character and specialization of production, as well as under various Ministries, depending upon the branches, categories and section of production to which they belong.

Coordination of Production

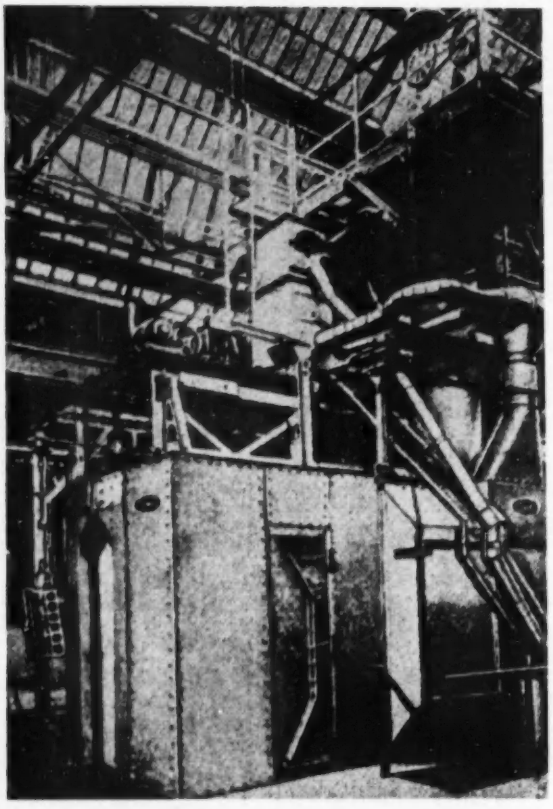
None of the plants of primary, secondary and related producers of the automotive industry of the USSR operate as completely self-sufficient units.

The production processes of all these plants of the Automotive Branch are in a greater or lesser degree related to the enterprises and establishments of other branches, through inter-branch *kooperirovanie*, as well as to affiliated plants producing components, spare parts, and appliances (inter-branch *kooperirovanie*).

The extent to which the automotive industry in the Soviet Union depends upon inter-branch coordination for its production may be illustrated by the following example. According to a recent source, more than 500 plants of various branches (including those not clas-



Probeda assembly conveyor at the Molotov Auto Works in Gorky. This car weighs 3050 lb and is powered by a 50 hp engine



Automatic cleaning booth using air and metal shot for cleaning automobile engine cylinder blocks



Automobile engine pistons on a so-called automatic production line

sified in the automotive industry) are involved in the supply of various materials and semifabricated products to the Molotov Automobile Plant at Gorki (ZIM).

Intra-branch coordination in the Soviet automotive industry is more highly developed between primary, secondary and related producers of the Machine Building branch, and its components-producer plants than inter-branch *kooperirovanie*. Within this system of coordination, the widest cooperation is observed between the auxiliary producers and the components-producer plants. For example, in terms of production volume, 50 per cent of the total production of the automobile repair plants is averaged at the components-producer plants, while in automobile assembly plants, from 90 to 100 per cent of the work spent in preparing assembly parts is shared by the components-producer plants. Approximately 75 per cent of the total production of component parts plants is shared by components-producer plants.

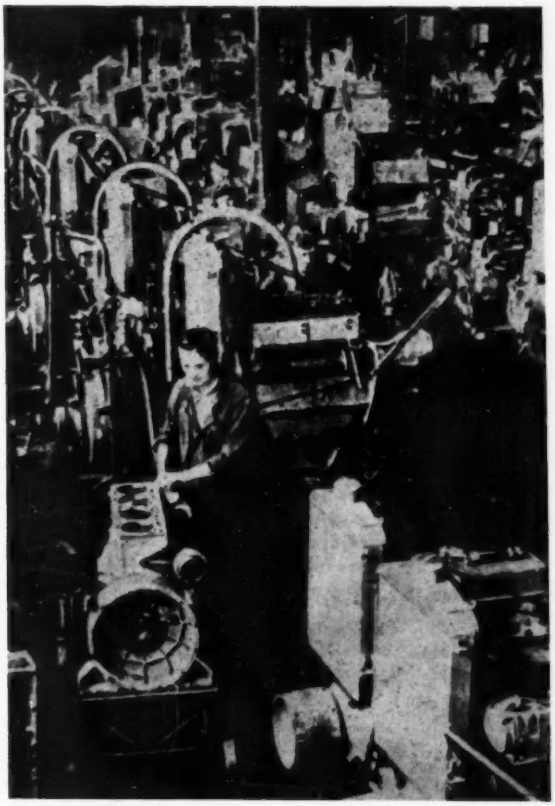
In the production of primary-producer goods the percentage of production shared by the components-producer plants is considerably lower and may range between 25 and 70 per cent; more often, this range lies between 30 and 40 per cent.

The highest degree of coordination may be found between plants manufacturing automotive appliances, fixtures, instruments and accessories; plants manufacturing automotive electrical appliances and fixtures; and between plants producing automotive standardized items.

System of Supply and Distribution of the Automotive Industry

Organization for the supply and distribution of materials for industrial production constitutes the most important aspect of production planning in the USSR. Purchases and sales of Soviet industrial commodities are handled through a centralized system of supply which is directed by an annual distribution plan, prepared by *Gosplan* and approved by the Council of Ministers.

The industrial supply plan which is drafted by *Gosplan* for the allocation of materials and parts to the various ministries and their departments is prepared in the form of "Material Balance Charts." These charts are subdivided into two main groups, which correspond to the two subdivisions of industry: Group A—producers' goods, and Group B—consumer's goods.



Assembly department of the Chersikovsk engine plant

The charts are established on the basis of a standard classification system of products and of the materials, fuels, etc., which go into producing them. This standard classification system is called the *Nomenklatura*, and is expressed in physical terms (in tons, meters, kilowatt-hours, units, etc.) as stipulated in the national plan. According to Miroshichenko, it is only on the basis of the physical indices of production that it is possible to arrive at an equitable plan of allocation of materials to industries, and to determine the proper relationship between resources and requirements in arriving at estimates for such items as metal, coal, fuel, and equipment. Without the physical indices, Miroshichenko claims, it is impossible to draw up the Material Balance Charts on which industrial production plans are founded.

This industrial supply plan, or Material Balance Chart, provides the basic data for determining the requirements of the national economy in certain kinds of industrial production.

The preparation of the Material Balances of industrial production starts with such allocations as those for (a) capital construction (equipment, building materials), (b) consumable goods (fuel, metals, chemicals) and (c) consumers' goods. The volume of capital construction in turn rests on the Material Balances of Equipment, Metal and Building Materials. It is finally determined only after all the resources of equipment, metals and building materials have been established, both from the estimated production for the planned year and from inventories of materials on hand at suppliers and consumers when the planned year begins. The plan also allows for stocks to be carried over at the end of the planned year.

The Material Balance Chart of Equipment, Metal and Building Materials coordinates the machine building branches with other branches of industry (coal-mining, oil, metallurgy, electric power, and with light industry and food industry), as well as with agriculture and transportation. The production program of the automotive industry for any one year is dependent upon what it receives in terms of allocations of materials such as metal and coal. Thus the elaboration of the Material Balance Charts makes it possible to determine, first, the requirements of the national economy in a given kind of production, and secondly, to coordinate those requirements with the supply sources.

The Material Balances are divided by volume into two sections: national and regional. The national section of Material Balances is programmed on the basis of resources and kinds of materials to be allocated to the entire national economy of the USSR. The regional section of Material Balances is worked out on the basis of resources and kinds of materials to be distributed among individual republics, territories, provinces, and economic regions.

The Material Balances are approved by the government (the Economic Council and the Council of Ministers) when the Five-Year Plan is approved.

The allocation of materials and equipment to enterprises takes place on the basis of so-called "material-technical" requisitions prepared by the enterprises. A

(*Turn to page* 102, *please*)

TABLE I

OUTPUT OF SOVIET AUTOMOTIVE INDUSTRY 1945-1950

(In Number of Units)

Year	Automobiles and Trucks	Tractors, Wheel and Tracklaying
1945	83,000	7,100
1946	113,500	12,600
1947	147,700	26,200
1948	219,000	53,500
1949	290,000	93,000
1950	400,000	118,200
1951	n.a.	n.a.
1952	n.a.	n.a.
1953	n.a.	n.a.
1954	n.a.	n.a.
1955 Goal	480,000	140,000

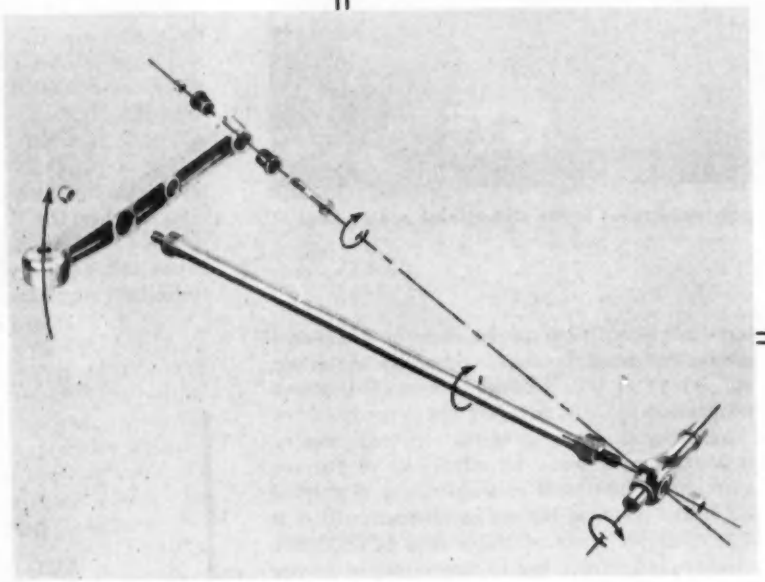
Prospects for

Torsion Bar Suspension on American Passenger Cars

By Joseph Geschelin

CURRENT EUROPEAN CARS with TORSION BAR SUSPENSION

Bristol—Rear
Citroen Big Fifteen—Front and Rear
Daimler Six—Front
Jaguar Mark VII and X120—Front
Jaguar XK120C—Front and Rear
Jowett—Front and Rear
Lanchester—Front
Lagonda—Rear
Lea-Francis—Front
Morris—Front
Riley—Front
Volkswagen—Front and Rear
Panhard—Rear
Wolseley—Front
BMW—Front and Rear
Mercedes-Benz—300—Rear (coil, auxiliary coil springs and torsion bars)
Pegaso—Front and Rear
Porsche—Front and Rear



Exploded view of front torsion bar suspension on GM Firebird.

JUDGING by recent events passenger car suspensions are due for a new look. Adoption of Thompson Products ball joint suspension by Ford, Lincoln, and Mercury marked another major change in front suspension design. According to some experts, one of the things to watch is some form of hydropneumatic suspension system that would give a ride comparable to the air spring suspension recently introduced on buses. In fact, at least one supplier is said to be working on it.

Apparently more than one motor car producer took another look at torsion bar suspension recently. Several reportedly were working with torsion bars at the front end, gave up the project temporarily before 1955 design was finalized. Too, we have evidence that one producer of cars in the high price bracket intends to launch a unique torsion bar suspension all around.

Although torsion bar suspension has been commonplace in European practice for many years (see AI, February 1 and February 15, 1950), it has not found favor in the U. S., probably because of higher cost and design complexity at the rear. A noteworthy production example is the gravity torsion bar suspension on Fruehauf tandem axle trailers. This was adopted as standard equipment by Fruehauf immediately after WW II (see AI, January 15, 1946).

Since European designers have employed the system so extensively, as evidenced by the list of current users reproduced here, why is it that torsion bars have not taken hold in the U.S.A.? Perhaps one explanation is that European producers invariably are more prone to use novelties of construction because of relatively low production volume and, consequently, more freedom of expression. At the same time it may be noted that Vauxhall used torsion bars at one time but found it expedient to revert to a more conventional suspension in the interest of lower manufacturing cost.

As a matter of fact, it seems logical to ask just what are the advantages of torsion bar suspension. Does it have engineering or cost advantages that would justify adoption on cars produced in large volume?

We directed this question to a number of recognized specialists but were unable to find clear cut favorable answers. Perhaps that is why torsion bars have not found favor up to now. Perhaps the system is considered more expensive than the conventional when all of the elements are taken into account. On the other hand, the availability of some new manufacturing techniques that promise cost reduction may provide incentive for another look.

At this writing the best evidence we can summon in favor of torsion bar suspensions is as follows:

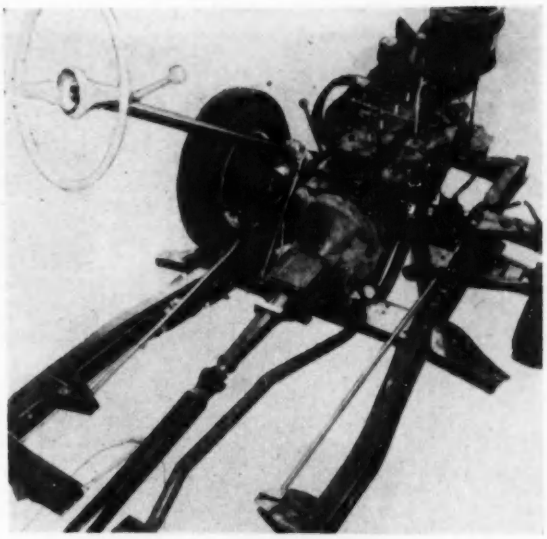
1. An element of novelty for what it is worth from an advertising standpoint.
2. An excellent boulevard ride.
3. Cleaner installation at the front.
4. Space saving, if that is essential. In fact, we are told that torsion bars were selected for the GM Firebird mainly because of cramped space at the front end.

At the same time, it is only fair to say that discussion of torsion bar suspension, past and current, necessarily has been based upon experimental attempts none of which were translated to practice. Since it seems certain that at least one prominent manufacturer will offer an entirely new suspension system in 1955 and since its disclosure will produce tangible evidence of principles and end results, it would appear best at this writing to withhold judgment until the returns are in.

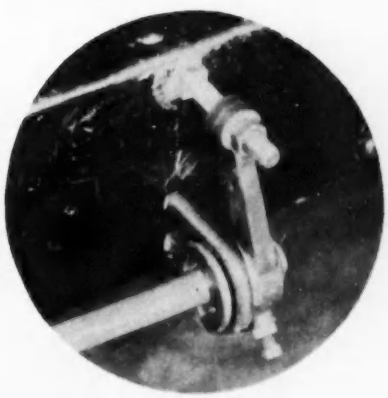
We suspect that when this announcement is made, it will be found that the new suspension system may carry a much higher price tag than the conventional type. On the other hand, certain hints around Detroit intimate that the resulting ride will be quite exceptional, thus will justify extra cost on cars already high priced. Suspension engineers then will have ample opportunity to appraise the new venture on the basis of analysis and actual ride results.

There are other favorable factors. For one thing, there are many manufacturing developments of recent origin that may be employed to reduce the cost of torsion bar suspensions. One of these is the new technique of spline and serration rolling, recently announced by Michigan Tool. With automation this equipment will spline or serrate bar ends at astonishingly lower costs than conventional machining methods. Cold forming is another cost-reducing method. It could be profitably employed for upsetting

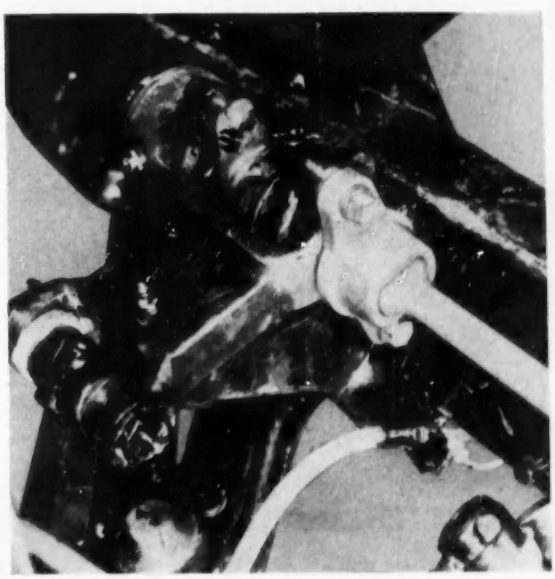
(*Turn to page* 142, *please*)



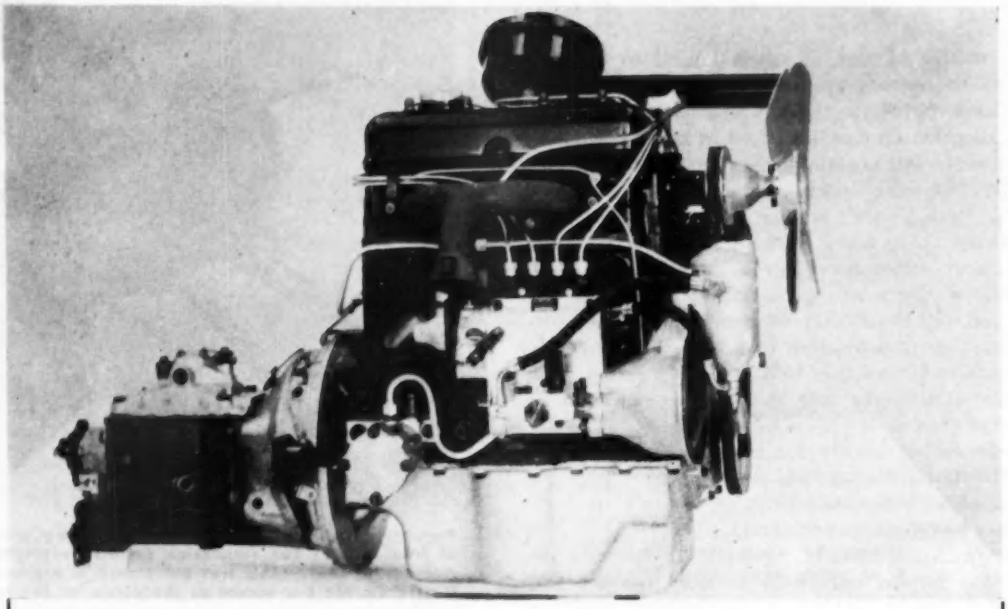
Plan view of Studebaker 60 chassis showing arrangement of front torsion bar suspension system developed experimentally in 1947. (This was not placed in production.) As illustrated, the bar serves as the pivot for the upper suspension arm at the front, and is anchored in the bracket at the rear.



On the ½-ton Studebaker chassis the fixed end of the torsion bar was held in the bracket shown here. The lever has a fine pitch adjustment for static alignment as well as for readjustment in the event of settling.



Studebaker conducted experimental work with a torsion bar suspension in front on a ½-ton truck chassis. This shows the method of attaching the bar to the lever system at the left, using a flange bolted to the lever. In this installation the bars are mounted outside the side rails.



Mercedes 170 S-D

Increasing Use of Diesels

Taxes on Gasoline and Diesel Fuel

	Gasoline tax, per cent of average retail price	Ratio of taxes, Gasoline/ Diesel, per unit volume
ITALY	71	1.82
FRANCE	68	1.56
BELGIUM	60.5	29.2
GREAT BRITAIN	58.8	1
NETHERLANDS	50.3	43.6
GERMANY	48.8	1.74
SWEDEN	45.6	23.5
SWITZERLAND	40.8	1.3

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

HAVING captured at least 90 per cent of the European heavy truck and bus production, the Diesel engine is now beginning to invade the passenger car field. This means that multi-cylinder Diesel engines are being built with piston displacements as low as 85 cu in. Three important firms—Fiat, Mercedes, and Borgward—now offer a Diesel-engined passenger car as an alternative to the gasoline engine powered model. Indications are that several others will join this group.

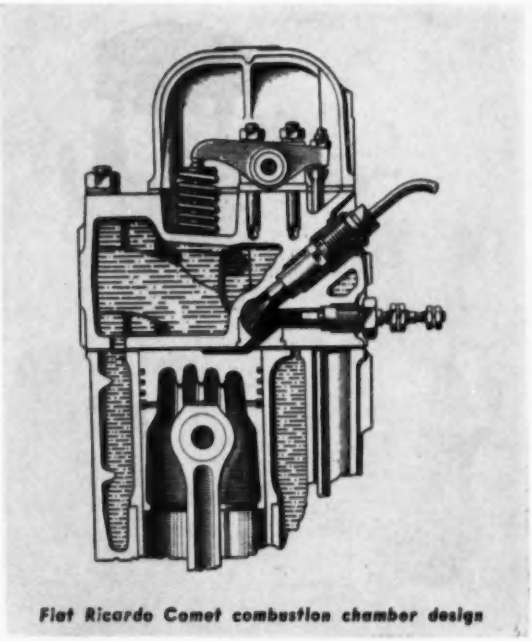
The success of the Diesel for passenger car service rests on the unstable foundation of State taxation. Every country in Europe seeks a revenue from gasoline taxation. The table shows the percentage of taxes on the average retail selling price of gasoline, and the ratio of taxes for gasoline and Diesel fuel.

In most countries the governments differentiate between the tax on gasoline and on Diesel fuel. The greater the differentiation, the greater the possibilities of selling small Diesels. Taxation, however, can

be altered by decree, and this possibility of an overnight increase acts as a deterrent in most cases. France offers a good example. Citroen was probably the first to produce a small Diesel for a 1000-lb delivery van. As soon as this showed signs of commercial success the Government boosted the Diesel fuel tax 50 per cent, with the result that the model was withdrawn. Since then no other maker has sought to produce a Diesel-powered passenger car in France.

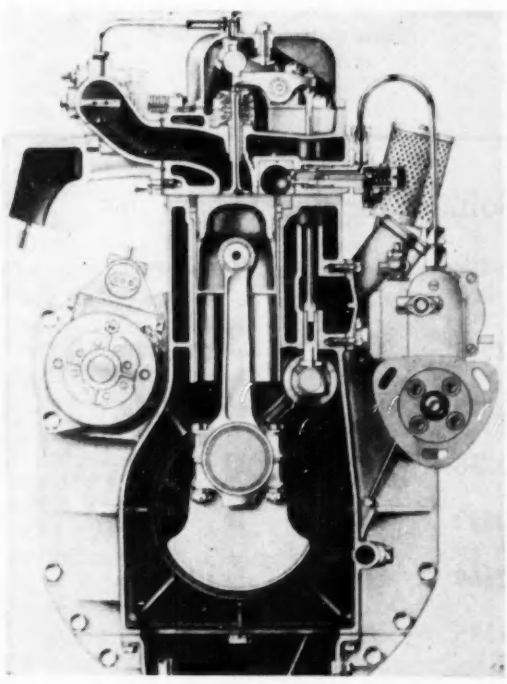
Prices at the refinery of gasoline and Diesel fuel are such that, with equal taxation as in England, 20,000 miles would have to be covered before costs would become equal. Even in countries where taxation lowers the selling price considerably, it is considered that the Diesel offers no advantages if the annual mileage drops below 20,000. On this account the small passenger Diesel is making its appeal to big mileage users, such as commercial representatives, doctors, taxicab owners, and operators of the type of vehicle which is used for both passenger and freight service.

Disadvantages of the Diesel are reduced maximum speed and inferior acceleration. Such complaints as odor and noise have almost been eliminated and service facilities are now practically equal to those for the

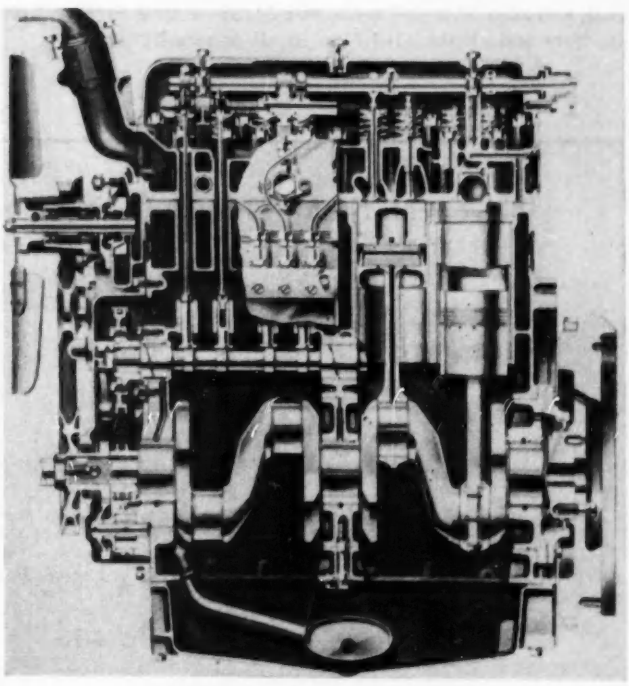


Fiat Ricardo Comet combustion chamber design

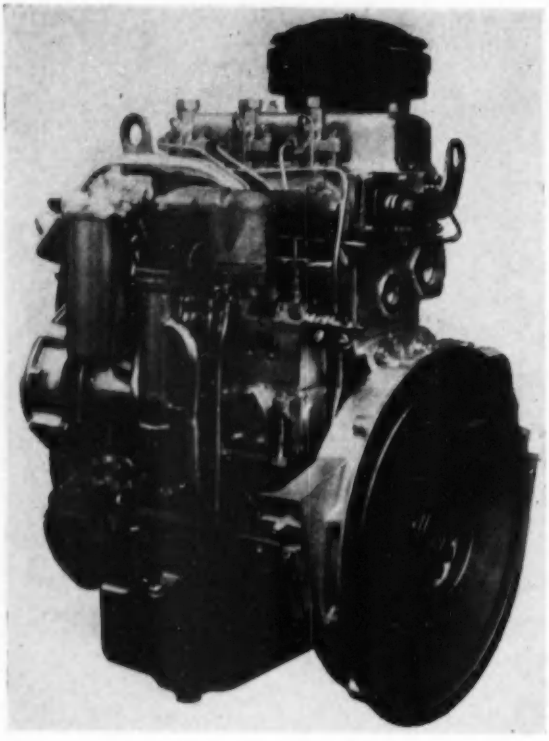
in European Passenger Cars



Standard combustion chamber detail



Cutaway view of Standard Diesel



Perkins three-cylinder Diesel

gasoline engine. Producing a Diesel passenger car since 1936, Mercedes is now specializing on the 170 S-D, a vertical four-cyl model of 2 31/32 in. by 3 31/32 in. bore and stroke (107.7 cu in. displacement), having a compression ratio of 19 to 1, and developing 40 hp at 3200 rpm. The Diesel engine has the same dimensions as the gasoline version and the two chassis are identical. The gasoline model has a maximum speed of 72 mph, the Diesel is limited to 62. Diesel construction carries with it an increased weight of 110 lb, including a larger battery and slightly reduced cooling capacity. Cylinders are in one casting with vertical valves; a pre-combustion chamber is used with glow plugs for starting; the Bosch injector pump is on the right-hand side; and aluminum is used for sump, clutch housing and engine accessory castings. The two chassis have a wheelbase of 112 in., tread of 51 and 56 in., and both carry five-passenger, four-door sedan bodies. Mercedes has supplied large numbers of this Diesel for taxicab service.

Fiat is in production on one passenger car Diesel, the 1400, with the new 615 N engine of 115.9 cu in. displacement, bore and stroke being 3¼ in. by 3 17/32 in. This engine has a cast iron cylinder block with wet liners, a detachable iron head with vertical valves, and the Ricardo Comet high-turbulence precombustion chamber. It has a compression ratio of 20 to 1 and develops 40 hp at 3200 rpm. Engine weight is 419 lb. Chassis layout is exactly the same as that of the Fiat 1400 gasoline model, with the main exception of a 24-volt battery. The same engine is used in the Fiat farm Jeep, in a light truck and in a 12-passenger coach.

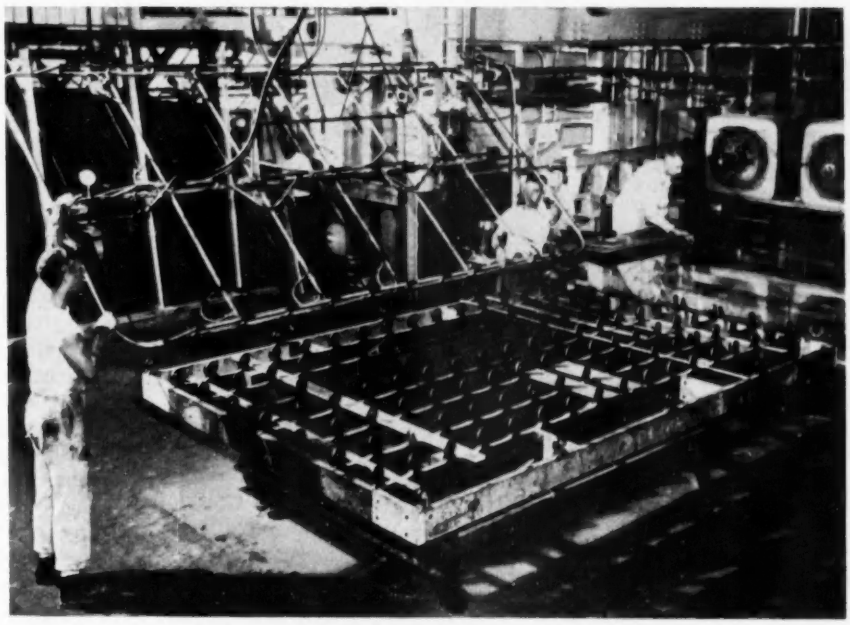
Borgward, with the Hansa 1800, comes into the same general class as Mercedes and Fiat with a four-cyl Diesel of 3 1/16 in. by 3⅝ in. bore and stroke (107 cu in. displacement). This is of the valve-in-head, precombustion type, with an output of 42 hp at

(*Turn to page* 116, *please*)

European Small Diesels Used on or Suitable for Passenger Cars

	No. Cyl	Bore & Stroke in.	Displacement cc	Displacement cu in.	Horsepower at rpm
MERCEDES	4	2.95 x 3.93	1767	107.7	40 at 3200
FIAT	4	3.22 x 3.54	1900	115.9	40 at 3200
BORGWARD	4	3.07 x 3.62	1758	107.0	42 at 3400
STANDARD	4	3.19 x 4.00	2092	127.5	40 at 3000
PERKINS	3	3.50 x 5.00	2360	144.3	34 at 2200
TURNER	2	3.62 x 4.13	1395	85.2	35 at 2800

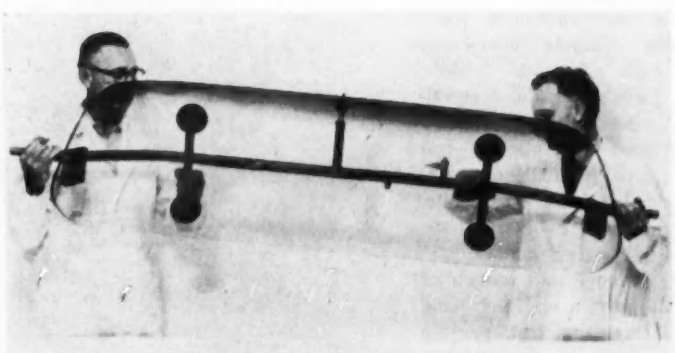
PRECISION SHAPING OF Panoramic Windshield Glass



A large piece of polished plate glass coming out of the washing machine (right) at the end of the production line in a Libbey-Owens-Ford Glass Co. plant at Toledo. A vacuum frame with rubber suction cups is used by the overhead crane to lift the glass off the roller table.

ONE of the striking developments on many 1954 models was the panoramic windshield for the new bodies. According to Libbey-Owens-Ford, the advent of this complex one-piece windshield stemmed from a program going back some 10 years to develop the technique of glass bending, of good optics to afford freedom from distortion, as well as the introduction of added facilities.

The bending of the complex glass was one of the major problems. Current methods employ large metal molds, precisely controlled furnace temperatures, and development of continuous moving conveyors to pace the operation by automation techniques. It is of interest that the making of laminated curved glass makes it necessary to process the twin lights of glass together so they will have matching curvature after bending.



The new panoramic windshield is not only high but long horizontally and weighs about 40 lb. It is made of two pieces of polished plate glass curved together in the bending process, then laminated with an interlayer of plastic, to provide built-in safety. A sucker frame with vacuum cups is used to provide a handle for lifting a panoramic windshield for inspections and installation.

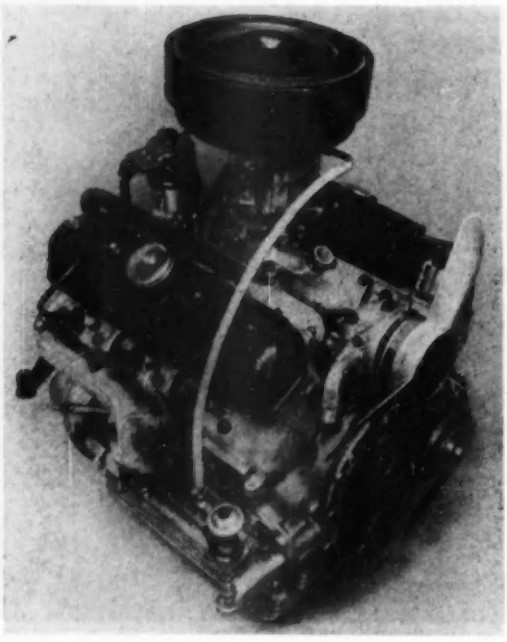
An Evaluation of a V-6 Aluminum Engine

By
John R. Long
and
Donald H. Perry
Development Division
Aluminum Co. of America

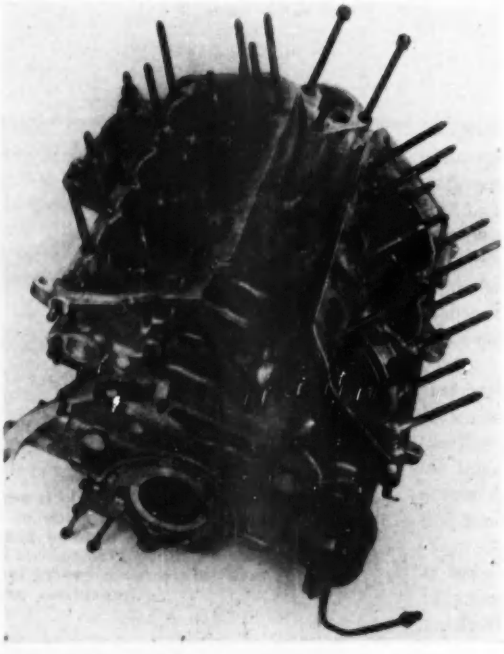
RESEARCH continues to bring cast aluminum engine parts for automotive applications closer to economic and engineering reality. Interest in aluminum engines has been quickened by the trends toward increasing both the horsepower-displacement ratio and the horsepower-weight ratio.

The interest of Aluminum Co. of America in the use of aluminum engines is a natural one. In this direction, Alcoa developed the sandwich-brazing method for fabricating cast aluminum engine blocks and cylinder heads and is continuing to improve it for eventual use in production. Since it is desirable for aluminum parts to compete cost-wise with ferrous metals, Alcoa's Cleveland Development Division Laboratories continue to improve production methods. At the same time, however, extensive testing is being done on performance and design of aluminum engines. One interesting test project in the use of aluminum has been carried out on the Italian Lancia V-6, Model B-10 engine.

This engine combines extensive use of aluminum with an interesting V-6 design. Forty-seven per cent of the engine's total weight is aluminum.



Lancia V-6, Model B-10 engine.



The crankcase which is a permanent mold aluminum alloy casting.

The Lancia B-10 was chosen for test purposes after Alcoa had made a survey of European automobiles in which light metals are more extensively used for production models. A Lancia Aurelia sedan was obtained which was powered by the B-10 engine, and the engine was given extensive road and dynamometer testing. Component parts were carefully inspected.

The Model B-10 engine includes many unique features in the 60 deg Vee, six cylinder, overhead valve design. The engine has a 2.75 in. bore, 2.99 in. stroke, and 106.9 cu in. piston displacement. The compression ratio was measured as 6.82 to 1 and dynamometer testing indicated a maximum horsepower rating of 59.9 at 4400 rpm (corrected to 29.92 in. mercury at 60 F dry air.) A maximum torque of 86.5 lb ft was attained at 2800 rpm and a minimum specific fuel consumption of 0.515 lb per hp-hr was observed at 2400 rpm.

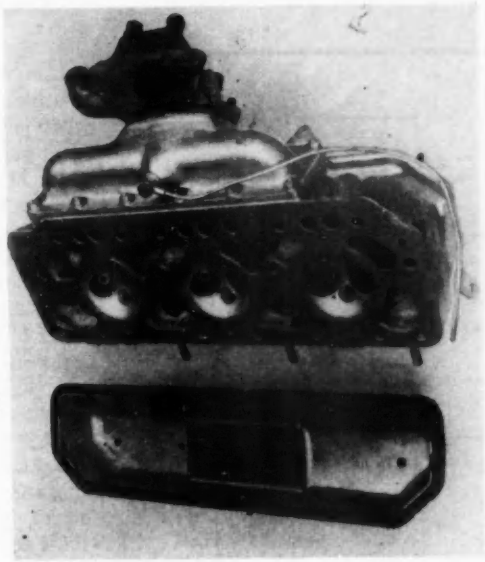
The four main bearing crankshaft has six crankpins, each spaced at 60 deg in a clockwise spiral from front to rear.

The firing order of 1-4 3-6-5-2, with the 60 deg between cylinder banks, results in equally spaced firing every 120 deg of crank rotation. It might be added that the engine was found to be exceptionally smooth throughout the speed range, even with a full load application at a speed of 800 rpm.

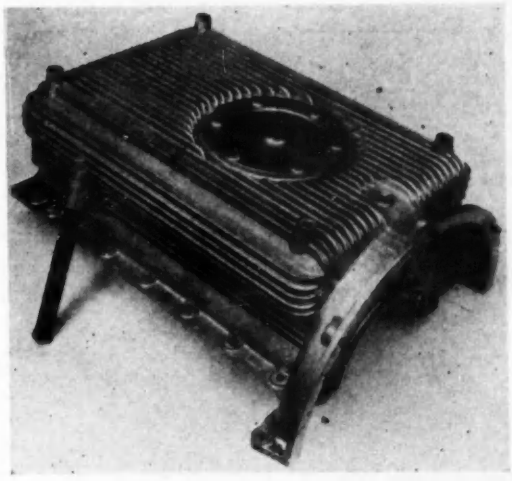
Although most of the oil seals are rather conventional, the crankshaft seal is novel. A reverse helix on the crankshaft pulley is fitted to a 0.010 in. to 0.015 in. clearance to the cast aluminum timing gear cover which functions as a reverse pump to make the seal. In a like manner, at the rear, a helical gear makes a seal with an adapter plate which is bolted to the crankcase. No leakage was noted in 11,409 miles of road operation.

The crankcase as illustrated is a permanent mold aluminum alloy casting and incorporates a wet cylinder liner design. A careful investigation of the crankcase revealed no use of dry-sand cores. Instead, the design has been so ingeniously developed that iron molds and loose metal cores are used throughout. The cast iron liners are flanged to seat on faces machined in jackets which completely enclose them, leaving about 3/16 in. water space around the sleeve. These are fed by tapered round water galleries on the outside of each bank. The liners are sealed with rubber O-rings at the lower end, and the water circulates up through passages in the flange into the cylinder head. After one and a half years of operation, there was no evidence of corrosion in the block or heads. City water and standard anti-freeze had been used throughout this period.

The performance of the main bearings in the aluminum alloy crankcase and bearing caps were of particular interest in view of the possibility of reduced oil clearances at low temperatures. The bearing shells are 0.200 in. thick with a bronze back and lead babbitt facing (about 0.025 in). Oil clearance was measured as 0.0013 in. at the time the engine was torn down. Engine breakaway torques were obtained at temperatures of −8 F and 80 F with values of 40 lb-ft and 17.3 lb-ft, respectively, being measured. An increase of this magnitude in breakaway torque certainly shows no tendency for the bearings to freeze up because of contraction of the block.



Cylinder heads are aluminum alloy sand castings; rocker arm covers are permanent mold castings.

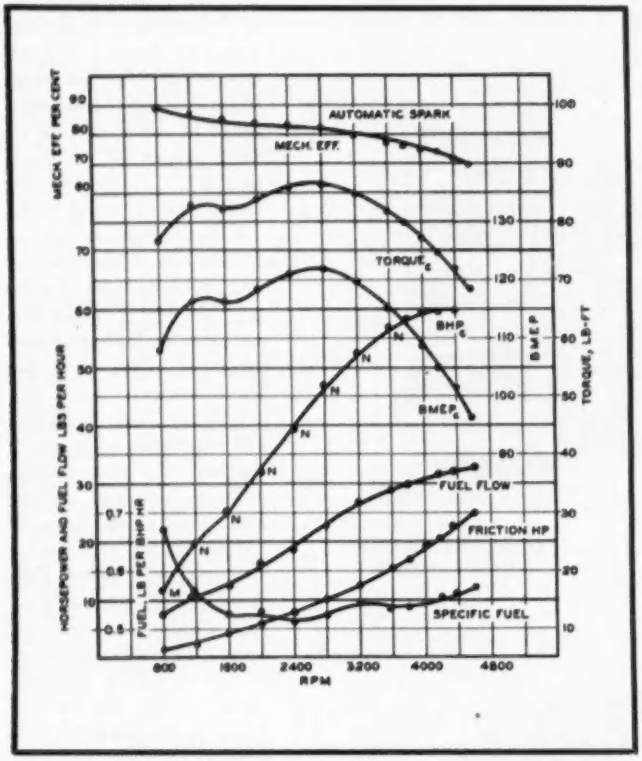


The oil pan, a permanent mold aluminum alloy casting.

The cylinder heads are aluminum alloy sand castings incorporating 1⅛ in. exhaust valves and 1 7/32 in. intake valves at 26 deg. from the center line of the cylinder, in hemispherical combustion chambers. The wide spacing of the cylinders in each bank allows the valves to lie in the longitudinal central planes of the banks. The 14 mm spark plugs are located at an angle of 27 deg to the longitudinal central planes. The rocker arm covers which are aluminum alloy permanent mold castings of approximately ¼ in. thickness, serve to reduce valve train noises.

The push rods are fabricated from aluminum tube with pressed-in flanged ends of steel. These push rods were an aid in maintaining proper valve lash with changes in the engine temperature. The tappets run directly in the aluminum block. The camshaft is supported by three split bushings and has a solid flanged bushing at the front. All these bushings are made of an aluminum alloy. The split bushings, held by retainer rings for assembly, are prevented from rotating by means of set screws. Valve timing may be varied by use of a vernier adjustment consisting of 12 holes in the camshaft and 11 holes in the camshaft gear.

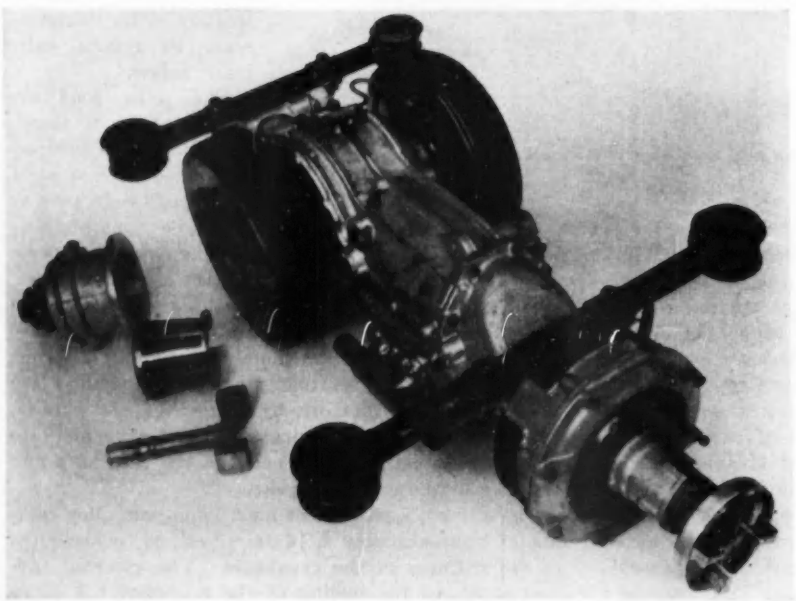
The oil pan, a permanent mold aluminum alloy casting of approximately 3/16 in. thickness, contributes to the stiffness of the crankcase. The external surface is ribbed for cooling of the lubricant. A large circular cover in the bottom is removable for cleaning of the sump and oil pick-up screen. *(Continued)*



Results of performance tests of the Model B-10 engine. Corrected to 29.92 in. Hg at 60 F dry air. Spark knock symbols: M-medium N-none.

The economical permanent mold process of casting aluminum alloys has been put to extensive use in the fabrication of parts for the Lancia Model B-10 engine. Of the aluminum used in the engine, 60 per cent of the total weight is made up of full permanent mold castings, while the remainder is in the form of sheet, sand castings and semi-permanent mold castings. This extensive use of permanent mold castings, in what might be considered rather limited production, should arouse some interest in this country in the manufacture of aluminum engine parts other than pistons. Such items as the crankcase, oil pan, rocker box covers, timing gear cover, distributor housing, etc. lend themselves well to the use of the permanent mold process of casting aluminum alloys, as has been shown by the Italians in manufacturing these parts for the Lancia.

Although this discussion deals primarily with the Lancia B-10 engine, mention should be made of the Lancia Aurelia sedan in which the engine was received. Such features as the full independent wheel suspension, unit body and frame construction, the clutch, transmission, and final drive location and design, as well as the extensive use of aluminum, are unique and interesting. The drive unit includes clutch, transmission, differential and brake. Of the 2390 lb total car weight, approximately 420 lb has been estimated to consist of aluminum alloys. Aluminum has been utilized in the fabrication of such parts as the clutch, transmission, and differential housings, drive shaft couplings, shock absorber bodies, brake shoes and cylinders. The body and trim include such aluminum parts as the doors, trunk lid, hood, gravel deflectors, bumpers, door handles and window molding.



Clutch, transmission and final drive of the car form a single unit. Note that rear brakes are mounted on the differential housing.

What does such liberal use of aluminum mean to the automobile manufacturer? In general, for each pound of aluminum used in a design, there is a total weight reduction of one pound. A 309 lb engine, which is 47 per cent aluminum by weight, would therefore weigh approximately 454 lb if manufactured entirely of ferrous materials. This would result in an increase in the specific engine weight of from 5.16 lb per hp to 7.5 lb per hp, all of which would be sprung weight over the front wheels.

Designs tailored for the more economical permanent mold or die casting processes may make cast aluminum automobile parts less costly and reduce weight.

Automation with Miller CYLINDERS



...assures non-stop production flow with BIG savings in maintenance and investment cost!

The production magic of "AUTOMATION" demands faultless performance—as the failure of one important component of "automation" machinery and equipment can shut down an entire manufacturing process.

In the "automation" application illustrated above, 22 Standard Miller High Pressure Hydraulic Cylinders are employed on each of two identical automotive transfer machines built by Ex-Cell-O Corp. of Detroit, Michigan, a recognized leader in the design and manufacture of "automation" equipment.

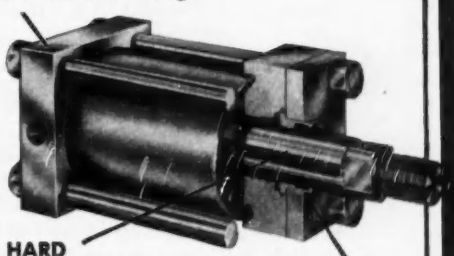
The machines perform—simultaneously and automatically—drilling, countersinking, counterboring, and tapping operations on automotive cylinder heads. And the Miller Cylinders accomplish the vital clamping, feeding, holding, rotating and locating operations that enable the machines to function as smooth "automation" production units.

Miller Cylinders are ideal for such "automation" applications. They withstand severest shock loads, provide millions of smooth strokes without repacking of seals or other maintenance. Their space-saving square design cuts installation and designing costs. They're available in an infinite variety of versatile power and stroke units that cover every need and permit the most economical choice for the application. And they fully meet the J.I.C. Standards.



Consult our engineering department or local representative. And write for complete information on this and other interesting applications and for our FREE Cylinder Bulletins A-105 and H-104.

SOLID STEEL HEADS, CAPS and MOUNTINGS
Eliminate Breakage



HARD CHROME PLATED PISTON RODS
Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS
Protect Rods, Seals, Bushings

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

Miller

MILLER FLUID POWER CO.
(Formerly MILLER MOTOR COMPANY)

2028 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

for transportation equipment that stands up...



FLAT-ROLLED STEEL produced by a specialist

The kids who roll down Oak Hill in a coaster wagon, and those of us who ride in the world's best automobiles, put a lot of faith in flat-rolled steel.

If you use flat-rolled steel in your products, rely on a specialist—Great Lakes Steel. Our entire organization is devoted to the business of making more and better flat-rolled steel for every application. Many manufacturers have found we have some unique qualifications to help them to improve products and reduce costs. We would like the opportunity to work with you on your problems.

Call on our 25 years of specialization in flat-rolled products. Our representative will be glad to discuss your particular needs at your request.

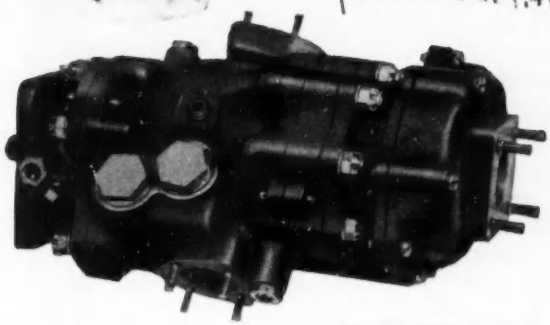
Great Lakes Steel
Ecorse, Detroit 29, Michigan
PRODUCER OF N-A-X HIGH-TENSILE STEEL NAX

UNIT OF NATIONAL STEEL CORPORATION

SALES OFFICES IN CHICAGO, CLEVELAND, GRAND RAPIDS, INDIANAPOLIS, LANSING, NEW YORK AND PHILADELPHIA

FOR CONTINUOUS NEW PUMP PERFORMANCE *and* DEPENDABILITY...





Pesco Model No. 022664 Engine-driven Dual Fuel Pump with inlet booster, for turbo-jet engine applications. 40 gpm @ 600 psig and 3690 rpm. Weight approximately 23.5 lbs.

YOU CAN RELY ON
PESCO *Pressure Loaded* PUMPS
FOR THESE ADVANTAGES

- DEPENDABLE PERFORMANCE
- LESS INSTALLATION SPACE REQUIRED
- LESS MAINTENANCE

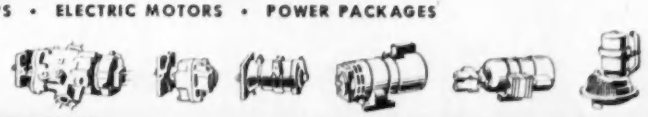
Aircraft engineers and operators know from experience that they can rely on PESCO "Pressure-Loaded" PUMPS for continuous "new pump" performance and operating dependability over a wide range of temperatures. These PESCO pump characteristics are the result of many years experience devoted exclusively to the development of fuel, air, and hydraulic pumps, hydraulic and electric motors, and accessory units.

The Pesco policy of continuous research and development, plus Pesco's complete facilities for advanced engineering, high-precision production and thorough testing all contribute to provide the one best product for your specific application.

These facilities are available for your immediate use. Simply call or write the Home Office, Bedford, Ohio.

Call or write the Home Office, Bedford, Ohio for full information on these Pesco products as applied to your specific installation.

HYDRAULIC PUMPS • BOOSTER PUMPS • FUEL PUMPS
AIR PUMPS • ELECTRIC MOTORS • POWER PACKAGES



engineering Pesco production
PRODUCTS DIVISION

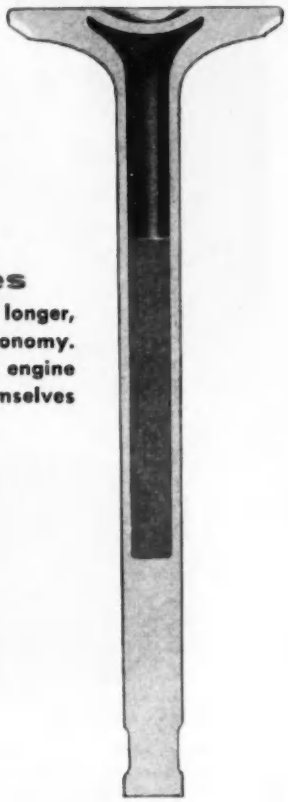
BORG-WARNER CORPORATION
24700 NORTH MILES ROAD • BEDFORD, OHIO

Eaton Offers 5 Methods of Increasing Valve Life



Eatonite-Faced Valves

Eatonite—heat resistant, corrosion resistant, wear resistant—applied to valves by a special Eaton-developed process adds materially to valve life in commercial vehicles and in heavy-duty industrial engines. Available as solid valves, hollow sodium-cooled valves, or free-valves.



Eaton Sodium Cooled Valves

Eaton Sodium Cooled Valves run cooler, last longer, maintain a high level of engine output and economy. They ordinarily require no attention between engine overhauls; keep trucks on the job; pay for themselves many times over.



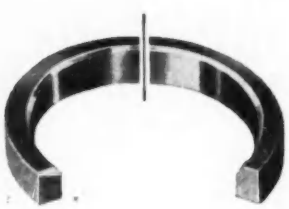
Eaton Free-Valves

Freedom to turn in either direction prevents formation of stem and uneven seat deposits; prevents sticking and scuffing; prevents valve burning and guttering; effects an appreciable increase in valve life. Eaton Free-Valves can be applied to engines of all types and sizes without costly design changes.

Eaton Hydraulic Valve Lifters



Eaton Zero-Lash Hydraulic Valve Lifters maintain zero valve clearance at all temperatures, and under all operating conditions; improve valve seating; prevent valves pounding into seats. Available in all types and in all materials, including heat-treated steel, hardenable iron, chilled-face, and puddled-face.



Eatonite Valve Seat Inserts

Valve seat inserts of Eatonite—heat resistant, corrosion resistant, wear resistant—reduce valve failure caused by prolonged operation at excessive temperatures and maintain a high level of engine output. Available for all types of engines.

EATON

MANUFACTURING COMPANY

General Offices: CLEVELAND, OHIO

VALVE AND SAGINAW DIVISIONS: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Welding eliminated HERE



Welding operation required in two-piece construction was eliminated by cold heading bolt in one piece.

Roll threading permitted faster production at lower cost.

A manufacturer of power lawn mowers uses a bent eyebolt as a mounting brace to adjust the cutting height of the mower blades. The bolt was formerly produced by welding an eye forging to a bolt made on a screw machine . . . and then bending into the shape needed. National was asked how this bolt could be produced faster and at lower cost.

National's "Special Products Service" came up with a method of producing the bolt in one piece by cold heading and roll threading. In this way, the welding operation was eliminated and the manufacturer realized a lower unit cost. Thanks to National's wide range of cold heading equipment and specialized know-how . . . the same type of economy can be offered you.

Bring your "Special" problems to National

Do you have a fastener or a small part problem that can be solved by National's "Special Products Service"? Our representative will be glad to discuss your needs. Write for free copy of National's "Special" fastener booklet.





REPRESENTATIVES IN:

Chicago	Kansas City, Mo.	Philadelphia
Cincinnati	Lansing	Rochester
Denver	Milwaukee	San Francisco
Detroit	Minneapolis	Seattle
Indianapolis	New York	St. Louis

THE NATIONAL SCREW & MFG. COMPANY
Cleveland 4, Ohio
Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.

MANUFACTURERS OF PHILLIPS SCREWS

National PRODUCTS

Fasteners  Hodell Chains  Chester Hoists 

FARVAL SPRAY VALVES save 95% of lubricant and do 100% better job

FARVAL—*Studies in Centralized Lubrication* No. 149

COUNT the number of open gears on your machines. Multiply the amount of grease required for these gears by 95% and you'll have the savings in lubricant alone which Farval Spray Valves can bring.

Even more important than lubricant saving, the Farval Spray Valve spreads and maintains a uniform thin film of oil or grease evenly over all bearing areas —eliminates friction, increases efficiency, lowers power costs, reduces wear.

The Farval Spray Valve System is designed especially for lubricating open gearing and slide surfaces. Using an adaptation of the familiar Dualine Valve, this system sprays oil or grease from nozzles in just the right amount and at any desired interval.

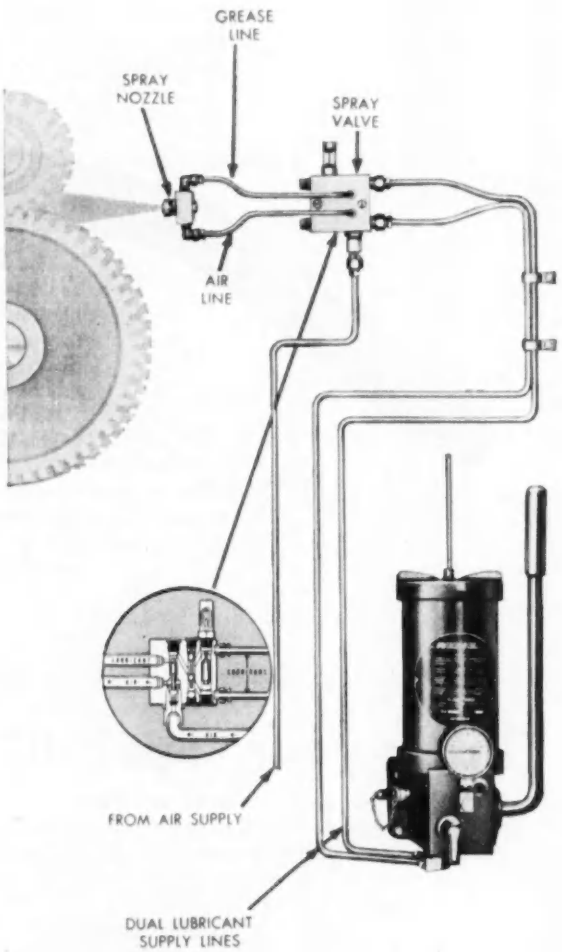
No more wasteful hand paddling of lubricant on gear teeth with the hope it will spread itself uniformly. No more blobs of grease splotching up the floor—creating safety hazards. The Farval Spray Valve System has proved it can maintain a clean, even film of lubricant at all times while machines are in operation. No waste. No mess. No trouble.

Farval Spray Valves can be inserted in a regular Farval Dualine System wherever compressed air is available. Or a complete Farval Spray Valve System may be installed, consisting only of Spray Valves served by a manual or automatic pumping unit. As indicated in the sketch at right, compressed air is directed through the Spray Valve, which meters air to the delivery nozzle at the same time that the lubricant is metered. Positive cut-off after delivery eliminates bleeding.

Why not insure that your open gearing and slide surfaces get the lubrication they need? Write for a copy of Farval Spray Valve Bulletin No. 60 today. The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.





Drawing shows component parts of the Farval Spray Valve Centralized System of Lubrication—manual pumping station, dual lubricant lines, compressed air line, single Spray Valve and nozzle. Both automatic and manual systems installed three years ago are in operation today, prolonging gear life, saving labor and lubricant.

News of the MACHINERY INDUSTRIES

By Thomas Mac New

With New Tax Laws in Effect, Machine Tool Builders Anticipate Increased Buying by Domestic, Non-Defense Industries

New Tax Law Features Five Write-Off Options

A step in the right direction has been taken to modernize the laws regarding depreciation of production equipment by providing two new options of write-off in the new tax law. Previously, the law gave the user three methods which were not advantageous in respect to machinery replacement programs. As the National Machine Tool Builders' Association points out, "with the so-called 'useful life' of a machine, as enforced by the Internal Revenue Service, extending far beyond its actual *profitable* life, only a portion of its cost could be recovered through depreciation allowances by the time the machine should be replaced by a new one."

The two new options, the double declining balance method and the sum of the digits method, provide for a machine write-off faster than the straight-line method. A company can write off about two-thirds of the original cost in the first half of a machine's tax life by the double declining balance procedure. Roughly three-quarters of the original cost can be written off in the first half of a machine's tax life by the sum of the digits method. The accompanying table shows all five options.

Machine tool builders report shipments for the first half of '54 totaled over $538 million which is $100 million less than the same period of 1953. Foreign shipments accounted for only 8.3 per cent of the total and Government shipments were well below last year. So, the 1954 first half figure indicates that there is a lot of buying by the domestic, non-defense manufacturers. It is felt that the buying has been mainly for replacement of obsolete equipment and that the new tax law will cause this trend to go upward.

Fifty for Pangborn

This month Pangborn Corp., Hagerstown, Md., held a celebration commemorating its golden anniversary as a manufacturer of blast cleaning and dust control equipment. Thomas W. Pangborn, founder of the firm, and still its active president, and John C. Pangborn, first vice president, were honored by the employes of the company who unveiled a bronze plaque as a permanent memorial of the occasion. The firm held an open house for visitors. From a small shop in New York City, the company now occupies several acres in Hagerstown. A feature of the open house was a tour through the offices and production shops. One of the displays arranged for visitors was a recent Pangborn installation of new blast cleaning and dust control equipment.

Although Pangborn reports that business is slightly off from its peak years, it still has a sizeable backlog particularly for special machinery. Questioned on leasing, company officials replied that the firm has no plans formulated at this time, except

(Turn to page 170, please)

The Five Options for Machinery Write-off

Remaining Undepreciated Balances on $10,000-Unit, Over 20 Years

	Straight Line 5%		Double Declining Balance		Declining Balance at 150% of Straight Line		Double Declining Balance 10 Years; Straight Line Thereafter		Sum of the Digits	
End Of	Deduction	Balance	Deduction	Balance	Deduction	Balance	Deduction	Balance	Deduction	Balance
1st Year	$500	$9,500	$1,000	$9,000	$750	$9,250	$1,000.00	$9,000.00	$952	$9,048
2nd Year	500	9,000	900	8,100	694	8,556	900.00	8,100.00	905	8,143
3rd Year	500	8,500	810	7,290	642	7,914	810.00	7,290.00	857	7,286
4th Year	500	8,000	729	6,561	594	7,320	729.00	6,561.00	810	6,476
5th Year	500	7,500	656	5,905	549	6,771	656.00	5,905.00	762	5,714
6th Year	500	7,000	591	5,314	508	6,263	591.00	5,314.00	714	5,000
7th Year	500	6,500	531	4,783	470	5,793	531.00	4,783.00	667	4,333
8th Year	500	6,000	478	4,305	434	5,359	478.00	4,305.00	619	3,714
9th Year	500	5,500	431	3,874	402	4,957	431.00	3,874.00	571	3,143
10th Year	500	5,000	387	3,487	372	4,585	387.00	3,487.00	524	2,619
11th Year	500	4,500	349	3,138	344	4,241	348.70	3,138.30	476	2,143
12th Year	500	4,000	314	2,824	318	3,923	348.70	2,789.60	429	1,714
13th Year	500	3,500	282	2,542	294	3,629	348.70	2,440.90	381	1,333
14th Year	500	3,000	254	2,288	272	3,357	348.70	2,092.20	333	1,000
15th Year	500	2,500	229	2,059	252	3,105	348.70	1,743.50	286	714
16th Year	500	2,000	206	1,853	233	2,872	348.70	1,394.80	238	476
17th Year	500	1,500	185	1,668	215	2,657	348.70	1,046.10	190	286
18th Year	500	1,000	167	1,501	199	2,458	348.70	697.40	143	143
19th Year	500	500	150	1,351	184	2,274	348.70	348.70	95	48
20th Year	500	0	135	1,216	171	2,103	348.70	0	48	0

NEW EQUIPMENT PLANT • PRODUCTION

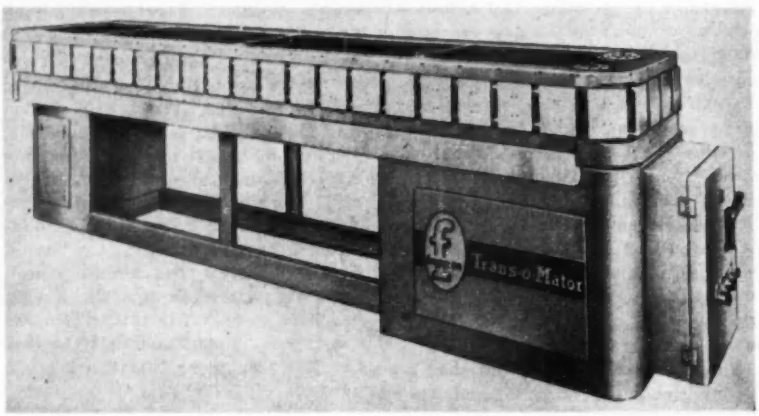
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Standard Conveyor for Low-Cost Automation

THE Trans-o-Mator is a standard multiple station transfer machine suitable for a variety of applications. The user can attach tooling as required to perform various light machining, forming, pressing, assembling and inspection operations.

The transfer machine contains a complete power transmission unit, including motor, reducer, clutch, Ferguson Roller Gear Drive for high speed precision indexing, chain and carriers. There is an electrical interlock system between the indexing and the tooling power supply as well as start, stop and jog controls and provisions for an automatic scanning device to insure proper function of all stations.

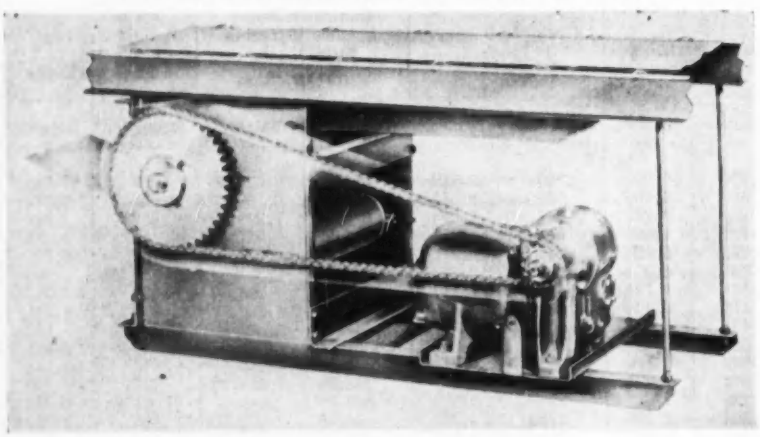
Basically there are two different standard Trans-o-Mators. Type A, with the carriers upright and circling the base, is designed primarily for use where versatility of operations is important and retooling may be required. Production rates as high as 6000 pieces per hour are said to be attained. The Type B, with the carriers horizontal, is said to operate at speeds up to 20,000 pieces per hour. It is manufactured with several variations in timing. *Ferguson Machine & Tool Co.*



The Ferguson Trans-o-Mator, Type A, for custom engineered automation of light machinery and other operations.

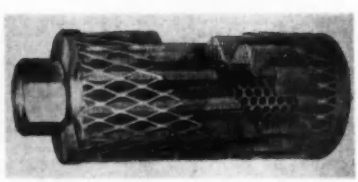
Circle 56 on postcard for more data

Combination Center Drive and Take-Up



Marketing of a combination medium duty center drive and take-up is announced, to be combined with roller gravity conveyors to form belt or live roll conveyors. The unit is made in widths of 12 in. to 24 in. in two-in. increments. One-half to one hp gear-head are furnished as standard with a maximum effective pull of 300 lb. (Lamson Corp.)

Circle 57 on postcard for more data



Filter for Hydraulics

All models of Synclinal filters have recently been adopted for use in the filtration of all types of non-flammable hydraulic fluids. No changes have been made in the basic Synclinal System which is designed to provide balance between maximum active filtering area and sufficient storage capacity. Available for either sump or line installation in capacities from five to 100 gpm, both types may be easily disassembled, cleaned and reassembled. Line type operates at full efficiency in any position and may be serviced without disturbing pipe connections. (Marvel Engineering Co.)

Circle 58 on postcard for more data

Pivot-Arm Loader for Presses or Machines

A FLOOR-TYPE automatic loader for presses and vertical spindle machine tools has two arms that are rotated through 120-deg motions. The motor driven loader will pick up parts one at a time from a conveyor line, deposit them in the press or machine tool and unload them onto another conveyor in two seconds.

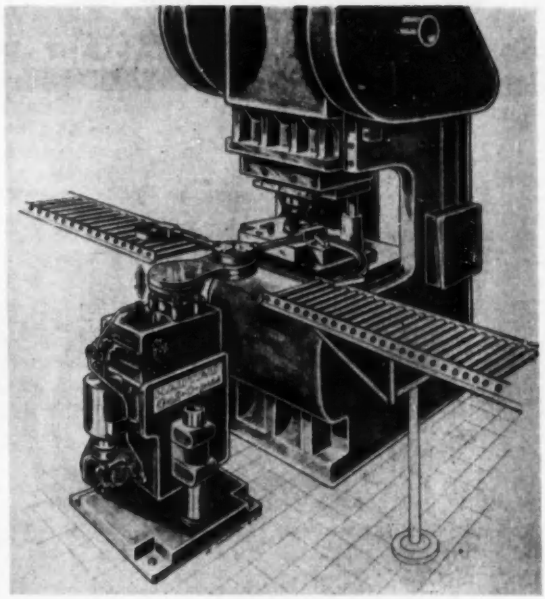
These loaders can be equipped with either one or two arms; the single-arm version is designed to act as press-to-press loader, automatically handling parts from one press to another in a line.

The Oct-O-Pus, as the unit is called, consists of a ⅓-hp motor, clutch, brake and speed reducer unit; a housing enclosing gear and cam mechanisms; an actuator box on top of the housing, which raises and lowers during the cycle; and a custom-made rotating arm assembly attached to the actuator box, which indexes during the cycle.

The actuator is intermittently powered by the motor through an electric clutch and brake unit. This positive drive is synchronized with the press or machine tool through limit switches. Two concentric shafts are included in the actuator. The outer shaft indexes the arms and the inner shaft controls clamping units in each arm.

A typical conveyor-to-press cycle for loading and unloading a press with a double arm assembly is as follows: A loader arm is indexed into the press working area and lowered over the part. Then it clamps the part, raises it from the die and indexes over the exit conveyor. The arm lowers the part onto the conveyor, releases it, raises and indexes to a clear station.

Simultaneously the second arm, which is mounted at right angles to the first arm, indexes over the incoming conveyor and lowers over a part. Then it clamps the part, raises, indexes in to the press working area, lowers the part into the die, releases it, raises and indexes clear of the working area. A total of twelve individual functions are performed. *Hautau Engineering Co.*



A typical two-arm conveyor-to-press-to conveyor application. The Hautau loader occupies a floor space about 22 by 26 in. and is about 46 in. high overall. Vertical travel of the actuator box is adustable from zero to six in.

Circle 59 on postcard for more data

Cables Inspected by the Scanning Method

CABLE Inspector is an automatic electrical wiring inspection system based on continuous scanning circuitry. Conductors are scanned at the rate of one per second. The standard unit is capable of checking insulation resistances to 110 megohms at 350 v dc. In addition, the Inspector is used to locate direct shorts and automatically ring-out multiple circuits. On a group of 100 wires, 10,000 tests of interconductor insulation resistance and insulation resistance to ground are performed in 200 seconds.

Adapters can be provided to match any of the various types of plug-in connectors. Fanning strips are used to check conductors wired to blocks.

The Inspector consists of two portable units; the Master and Slave. The Master unit incorporates the operating controls and adjustments and is used for all inspection functions. The Slave unit is used in conjunction with the Master for identification of cable circuits only. The two units are entirely self-contained, needing only a 115 v power supply. *Panascan Div. of Panellit, Inc.*

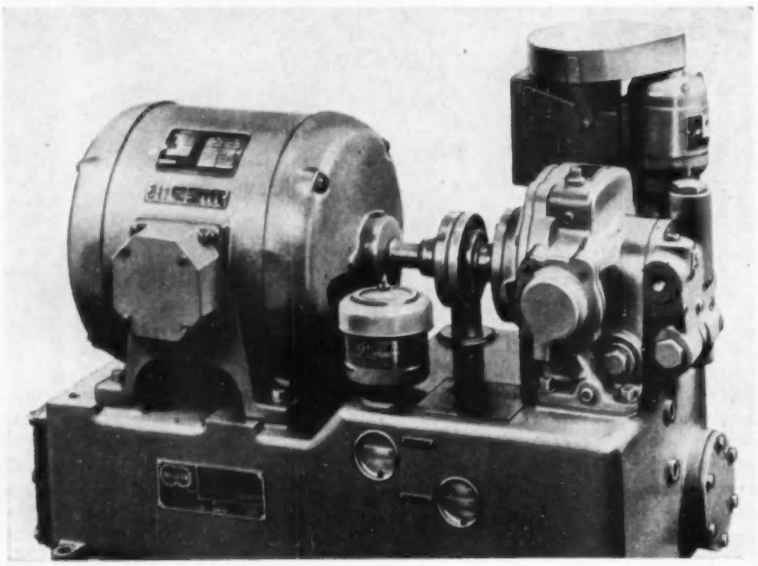


The Panascan Master Unit being used to check insulation resistances of multi-conductor cables installed in a control cubicle. An adapter cable with receptacle is used to match AN connectors installed in the cubicle.

Circle 60 on postcard for more data

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89



Oilgear type AE-311 two-way variable delivery pump with electric geared head motor control, oil reservoir base, and three-hp motor.

Variable Pumps in Packaged Units

FOR variable speed straight line and rotary drive applications requiring one to three hp under precise speed or pressure control, a complete line of one- and two-way variable delivery pumps is now being built. Each pump is a complete package unit incorporating a variable delivery, high pressure, radial piston pump with balanced flat valve; a constant delivery, low pressure gear pump (small and large size); one of eight standard controls; a three-way suction and return valve for differential systems; dual disk type check valves for non-differential systems; a double acting high pressure relief valve; and a gear pump relief valve.

Compact hand-screw, hydraulic servo-motor lever, automatic adjustable pressure unloading, hydraulic remote, electric remote, electric-hydraulic servo and pneumatic controls mount on either side of the pump case.

These pumps can be mounted on reservoirs integral with machines or furnished with standard oil reservoirs for mounting both pump and electric drive motor. Specifications include drive speeds from 710 to 1750 rpm, at a maximum continuous working pressure of 1140 psi. *The Oilgear Co.*

Circle 61 on postcard for more data

Expandable Prefab Test Chamber

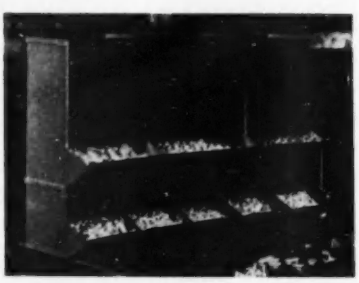


Production of an improved line of prefabricated temperature-humidity test chambers is under way. Made to any size required, the units feature expandability after installation. Exteriors of the new chambers are of 25 gage aluminum, interiors are of 30 gage stainless steel, each bonded to ¼-in. plywood. Insulation of from four to 12 in. of Fibreglas is utilized, depending on the range of temperature required. A special sealing compound is used on all seams to prevent infiltration of moisture. Humidity features can be incorporated. (Bowser Technical Refrigeration.)

Circle 62 on postcard for more data

Small Parts Bins

HOPPER-FRONT steel bins for positioning a variety of small parts at the use-point, called Work-O-Matic parts bins, are made in seven sizes. The vertical containers are equipped with hanger angles. All sizes measure six in. from front to back on the bottom and top. Hopper front is three in. deep. Largest bin is 18 in. wide and 24 in. high. Smallest unit measures six in. in height and width. *Union Metal Manufacturing Co.*



Using the Union Work-O-Matic parts bins.

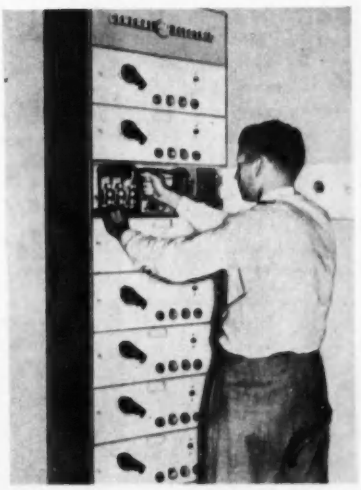
Circle 63 on postcard for more data

Compact Control Centers Add Safety Features

A LINE of motor control centers which are said to be unusually compact in design was introduced recently. To be known as DA7093, this control center, according to the company, will save up to 50 per cent in floor space. It will take nine NEMA Size One starter units, or six NEMA Size Two units in the standard 90-in. trough without reduction in pull-box space. The starter units will be of either the fusible or circuit breaker types.

A center busing arrangement frees pull-box space for wiring and increases vertical bus capacity from 300 to 600 amp. This same arrangement also makes available continuous main buses of 600 or 1200 amp capacity in standard construction up through five sections. The trough is designed to take straight-in wiring to main lugs.

A separate insulator is furnished for each bus. Main buses are mounted in an edge-to-edge arrangement and vertical bus bars are spaced on five-in. centers. Both of these innovations are said to afford increased short circuit capacity.



Units which are mounted on the unit frame are inserted and withdrawn from the center in a drawer-like operation by means of an L-shaped handle. A unit may be locked in the withdrawn position, and the operating handle can also be padlocked in either the on or off position.

Also incorporated in the DA7093 are newly designed split Type "B" terminal blocks which allow starter units to be removed or inserted without disturbing established wiring. Terminal connections are made by means of captive screws.

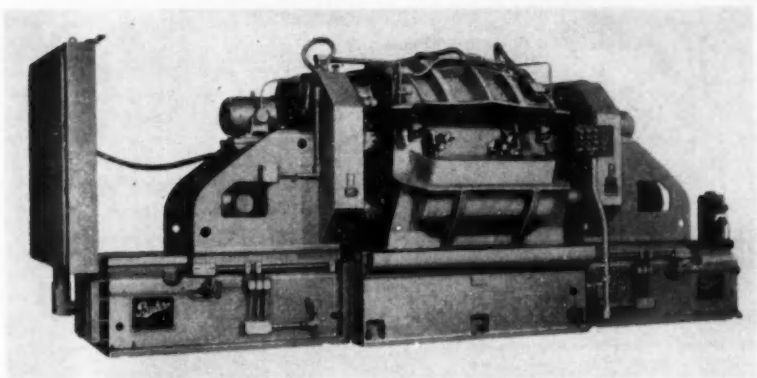
Push buttons are mounted on the unit door, and when pressed, actuate the contacts by means of plunger-type extensions.

Cadmium-plated gliders, mounted on the underside of each unit, ground the unit to the cadmium-plated base upon which it rides. As an additional safety factor, this grounding occurs before the unit engages the bus bars. The same cadmium-plated base upon which each control unit rests also acts as an isolating barrier.

Each standard section measures 13½ in. deep by 24 in. wide. These sections can be installed back-to-back, with a combined depth of approximately 27 in. The DA7093 control center is made in NEMA-1 or 1A enclosures and NEMA Type A, B and C construction is available. *General Electric Co.*

Circle 67 on postcard for more data

Two Axle Shafts Drilled and Tapped



Thirty-six operations on two rear axle drive shafts at one time are performed on this special double-end trunnion machine. Gross production rate is 328 pieces an hour. Operations include drilling, chamfering both sides of holes, and tapping. The six-station two-way machine loads two parts at each station, and features automatic hydraulic clamping and unclamping. Cluster heads are incorporated in a master gear box. All multiple heads are of ball-bearing construction with shaved gears and broached-and-splined drives; tapping spindles are of the lead-screw type with precision-ground and hard chrome-plated threads; automatic cam-and-roller index is electrically controlled. (Buhr Machine Tool Co.)

Circle 64 on postcard for more data

Heavy-Duty Compressor

A PACKAGED air compressor in the 75-100 hp range that approaches the efficiency and economy of larger slow speed compressors has just been introduced. The new machine, known as the PHE, is an opposed-cylinder, balanced design driven by a direct connected induction motor. It is a packaged heavy-duty unit, arranged in single or multi-stages. The basic design is a two-stage unit for 80-125 psi but other cylinder arrangements are available for higher pressures or for pumping vacuums.

The full-floating aluminum bearings rotate slowly thus taking the major thrust of each succeeding stroke on a different portion of the shell. All three main bearings are interchangeable. Piston and rod assemblies of equal weight, moving in opposite direction on an 180 deg crank balance out all primary and secondary inertia forces without the use of counterweights. The crossheads are of the aluminum piston type. The valves are the A series channel type with "double-life" seats.

Other cost saving features are: Individual adjustable sight-feed lubricators for cylinders and packing; water through tube intercooler between stages; three step air-operated regulator. *Ingersoll-Rand Co.*

Circle 65 on postcard for more data

Bearing Mounts

IMPROVEMENTS in the light duty ED series of regular and rubber insulated ball bearing pillow block and flange mountings have been announced. All are now equipped with double setscrews for more permanent shaft locking. In addition, the units now have a standard gun type of lubricant fitting instead of the ball check oil fitting formerly used. The series includes the ED pillow block, the FED flange, and the EDR rubber-insulated pillow block with rubber mounting. *Ahlberg Bearing Co.*

Circle 66 on postcard for more data

NEW EQUIPMENT — PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Radiator Tube Mill Is Continuous



The Kane & Roach continuous radiator tube mill in operation.

A radiator tube mill recently built consists of a coilholding reel, an electric brazer and a stock reservoir for joining the ends of coils without stopping the rolling (right); a cold roll forming machine for forming an elliptical lock seam tube with the seam on edge; a continuous tinning machine; a roll straightener and an automatic cutoff machine. Two size tubes, 0.746 by 0.094 in. and 0.732 by 0.120 in. each in gages of 0.0065, 0.008, 0.010, and 0.012 in. were formed and tinned and cut to lengths of from 20 to 60½ in. at a production speed of 200 fpm with a length tolerance of ±1/32 in. *Kane & Roach, Inc.*

Circle 68 on postcard for more data

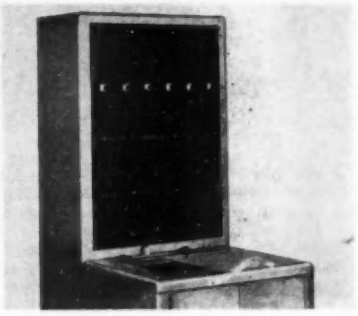
Oscillograph

THE Type M Dynograph recorder is a high speed direct-ink-writing oscillograph, designed to provide high, stable d-c or a-c amplification. It may be used with reluctance type pick-ups without auxiliary equipment. There is said to be no need for additional amplifiers or pre-amplifiers for moderate or high gain d-c, or for Carrier applications.

Input requirement is 150 microvolts d-c per centimeter of pen deflection. It is said to be non-drifting. Pen response is 1/120 sec. Over eight cm of pen excursion is available, with a linearity of one per cent up to four cm.

The Type M is housed in a mobile metal console. It features individual plug-in amplifiers, and by means of input panels provides all connections necessary for a variety of signal pick-ups. *Offner Electronics.*

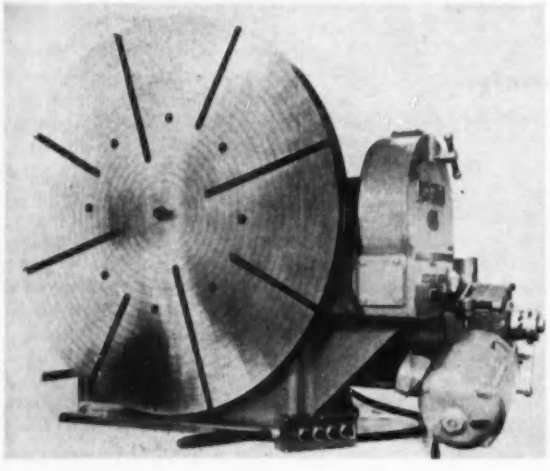
Circle 69 on postcard for more data



The Offner Type M Dynagraph.

Radial Fixture Set with Optical Micrometer

IMPROVEMENTS have been announced in Rotab, a device calibrated for movement in all planes to facilitate machining and checking radial and angular operations. One is an optical micrometer microscope with glass vernier recticle which permits direct reading to five seconds of arc on a special graduated ring with clockwise and counter-clockwise markings from 0 to 360 deg. The ring, which is located directly under the rotating table and is rotated to the desired degree setting and clamped in position to become a fixed part of the table, is individually processed to avoid accumulative error in degree markings.



Rotab fixture for radial and angular operations.

The center spindle mounted on preloaded precision bearings, extends beyond the back plate and provides a point to attach a sine bar, when the face plate is in a vertical position for obtaining radial measurement from a shelf by block gage setting.

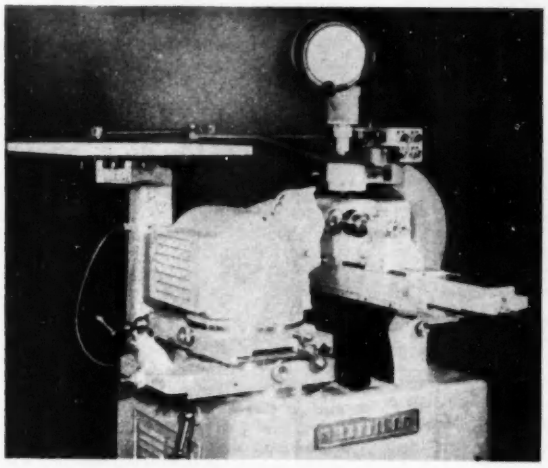
The device is made with 12, 24, 36 and 48 in. diam face plate with motor drive for rotation on the larger sizes, and power tilt on 36 and 48 in. sizes. *Machine Products Corp.*

Circle 70 on postcard for more data

Circular Form Grinder Revealed

INTRODUCTION of the model 123 micro-form grinder was announced recently. It will grind cylindrical work and circular form tools up to eight in. in diameter and eight in. long, especially for forming, beading, and seaming rolls.

Designed to be used for circular grinding only, this special purpose machine permits finish grinding directly from a drawing, requiring neither templates nor masters. It is available with either a 30-power scope or 30-power combination screen and scope. It may be furnished with either live or dead center workheads. The pantograph has a ratio of 50 to 1, and the drawing table will accommodate a 20 by 20-in. drawing.



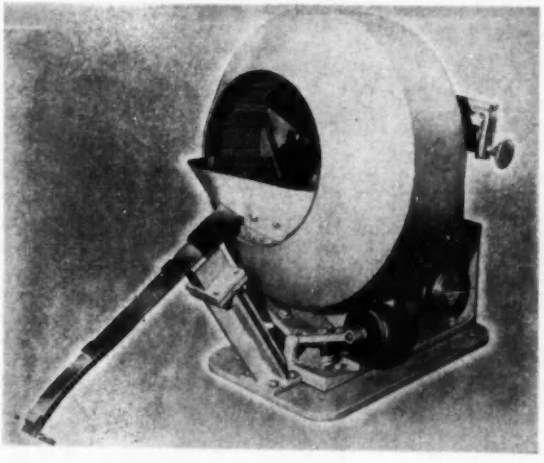
Dimensions of the Sheffield Micro-Form Grinder are: depth 44 in., width 60 in., floor to eye piece 54 in.

Work up to 10 in. in diameter and nine in. in length can be swung between centers. Maximum size grinding wheel used is seven in. Spindle and workhead both are in a fixed vertical plane.

The wheelhead, vee belt driven by one-hp, 1725 rpm, ball bearing motor, provides a spindle speed of 3000 rpm. The gear driven workhead equipped with change gears is powered by a ⅓-hp, 1800 rpm motor, providing workhead speeds from 40 to 360 rpm. *Sheffield Corp.*

Circle 71 on postcard for more data

Tumble Hopper Line Expanded



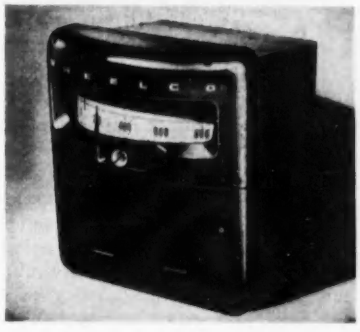
The Feedall tumble hopper pictured is 24 in. in diameter, the largest of three sizes available.

THE addition of the Model 400 tumble hopper to a line of mechanical hopper feeds was announced recently. The model 400 is self-contained, mounted on a flat base, of fabricated steel construction. Powered with a ¼-hp three phase motor, the unit has a variable production rate provided by the integral variable drive. It is reported to be readily adaptable to assembly presses, centerless grinders, secondary operation machines or other high production machinery.

Range of work to be fed includes washers, nut blanks, nuts, special stampings and headed parts up to ½ in. diam. *Feedall Machine and Engineering Co.*

Circle 72 on postcard for more data

Plug-In Controller



The "400" Series Capacitrol is self-contained direct deflection indicating controller adaptable to many process applications. Features include plug-in measuring system and control chassis. The measuring system has automatic compensation for variations in cold junction temperature and internal resistance changes. A fused grid cathode oscillator links the measuring and control systems. (Wheelco Instrument Div., Barber-Colman Co.)

Circle 86 on postcard for more data

Whiteprinter is Automatic

A SO-CALLED low-cost, fully automatic, high production whiteprinting machine named the Challenger is announced. With automatic tracing separation feature, it is a one-step feed machine, with printer and developer synchronized to a maximum of 40 fpm.

As its light source the Challenger is equipped with a GE 4000-watt (82 watts per inch) high pressure mercury vapor lamp, controlled by constant wattage transformer. Other important features are: Formica feed table, simplified print feeding, front and rear print delivery at no additional cost, and electronic speed control. At 40 fpm an 8½ by 11-in. tracing is returned to the operator in 2½ sec after feeding, and the finished whiteprint delivered in 6½ sec. *C. F. Pease Co.*

Circle 73 on postcard for more data

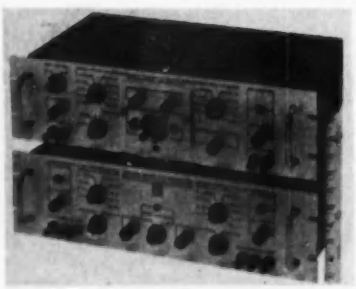
NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Two Amplifiers

THE model BL-520 universal amplifier and the model BL-530 and channel d-c amplifier, have been announced.

The model BL-520 is a very high gain carrier amplifier that accepts



Brush amplifiers

signals from both resistive and inductive transducers. It will measure and record on a direct writing oscillograph a wide range of physical phenomena: strain, force, pressure, temperature, displacement, vibration, acceleration, motion, etc. It has a maximum sensitivity equivalent to ½ microvolt per chart millimeter, or, for strain measurements, 0.25 microinches per inch. A d-c medium gain amplifier section with calibrated attenuator may be used separately for voltage and current measurements.

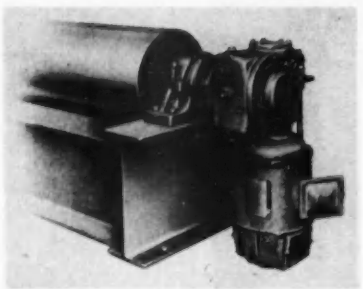
The model BL-530 will accept both single-ended and differential signals with a 50 millivolt sensitivity and provides for accurate calibration of the recorded signals.

Both amplifiers provide for balancing out voltages up to 10 times full scale at input signal levels up to 500 v. *Brush Electronics Co.*

Circle 74 on postcard for more data

Floating Drive

THE compact gear unit and motor of the Floating GearMotoR mount directly on the driven shaft for roll or conveyor drive. A torque arm prevents the gear unit from sotating. The floating GearMotoR can be mounted in almost any location or



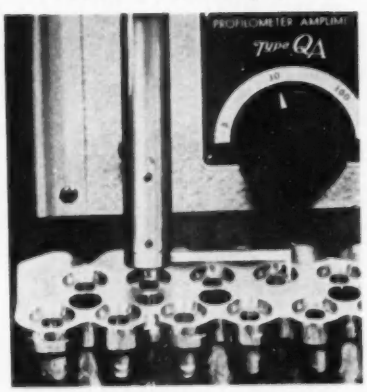
The Philadelphia Floating Gear Motor.

position due to its compact design. The right angle worm and worm gear arrangement permits the entire unit to nestle close to the driven machine.

A range of output speeds from 8 to 800 rpm are available with integral electric motors ranging from 1 to 15 hp. *Philadelphia Gear Works.*

Circle 75 on postcard for more data

Traces Slot Roughness



The Profilometer type GC tracer measures surface roughness across the bottom of flat-bottomed grooves and slots to ¼-in. depth and behind shoulders to ¼-in. height. When measuring crosswise, it permits 1/16-in. length of trace in slots of 5/32-in. width, and greater length of trace in wider slots. It measures lengthwise in slots as narrow as 5/64-in. It can also be used in ID's from 25/64-in. to flat, and on all other internal and external surfaces where the geometry of the work permits and where the part can be mounted with the work surface approximately horizontal. (Micrometrical Manufacturing Co.)

Circle 76 on postcard for more data

Power Source

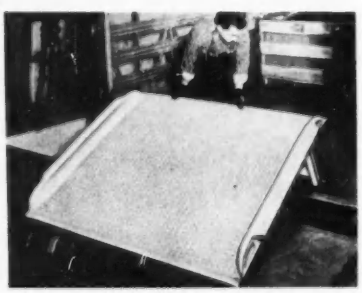


"Power in a Package" has been developed to give a wide range of power outputs from one compact cabinet. The unit illustrated provides regulated power simultaneously, as follows: 0-600 v dc at 0-500 mils, regulated 0.25 per cent; six or seven v dc at 1.5 -15 amp, regulated 0.2 per cent; 110-120 v ac, 0-1000 va load range, regulated 0.1 per cent. Other combinations are available. (Sorensen & Co.)

Circle 77 on postcard for more data

Light Dock Board

A SERIES of magnesium dock boards recently announced are equipped with a unique safety curb which cannot be damaged by power truck wheel rims, according to the company. A special-alloy curb end of cast magnesium is of wide-radius design to facilitate turning on and off the



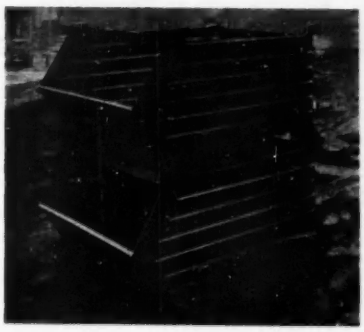
Magnesium dock board.

board in narrow quarters. Easily handled by one man, the new dock boards are custom-engineered by the company to meet specific dock and operating conditions. They can be built to handle loads up to 20,000 lb. *Magline Inc.*

Circle 78 on postcard for more data

Tierable Hopper

A HOPPER-FRONT dump box designed for compact tiering and roll-over dumping has just been developed. The corrugated 12-gage steel containers permit unit-load handling and compact tiering of purchased parts or in-process material. Small



The Union dump box has double-locking tiering angles at rear corners and a reinforcing bar across the front.

quantities can be manually removed from stacked boxes through their hopper front. Fork slots on both sides of the box provide for safe roll-over dumping. Four-way fork entry speeds handling in crowded quarters.

The one-piece box bottom is folded to form the hopper front and flanged up around the sides to form an oil-tight reservoir two in. deep. *Union Metal Mfg. Co.*

Circle 79 on postcard for more data

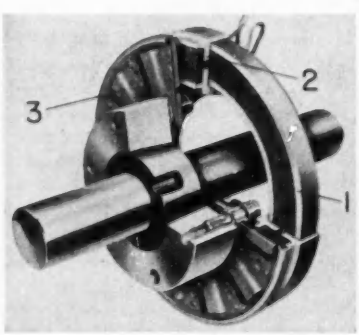
Brake and Clutch

A COMPLETE line of electric brakes and clutches, suitable for use in all types of industrial machinery, has recently been put on the market in a wide range of sizes.

The new brake contains only three main parts: the field, the armature, and the replaceable face. Adjustment for wear on the brake is completely automatic.

The electric clutch operates on a "stationary field" principle. It needs no slip rings or brushes. Both the brakes and the clutches are being manufactured in the torque range of eight lb in. to 700 lb ft. Smaller and larger sizes are also being developed for future production. *Warner Electric Brake & Clutch Co.*

Circle 80 on postcard for more data



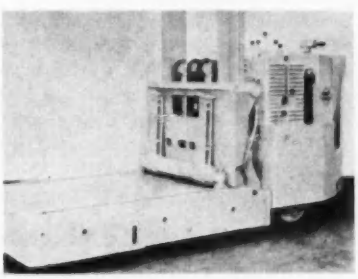
The Warner stationary field clutch and replaceable face brake have three main parts: 1) field, 2) replace face, and 3) armature.

Fluid Worm Reducer

A COMPACT, worm type speed reducer features fluid-cushioned starting. It is especially adapted to powering loads that require smooth, gradual acceleration such as mixers, conveyors, centrifugals, cranes, etc. Worm reducers are available from ⅓ to two hp. Speed reductions from 24 rpm through 140 rpm are offered. Units can be ring or foot mounted as desired. *Reuland Electric Co.*

Circle 81 on postcard for more data

Die Pullers



A line of die pullers with capacities ranging from 10,000 to 100,000 lb features hydraulic lift and hydraulic push-off units which permit inching action. The two pusher arms can be operated independently or simultaneously to permit accurate maneuvering of the die into position. All wheel power steering is offered. (Elwell-Parker Electric Co.)

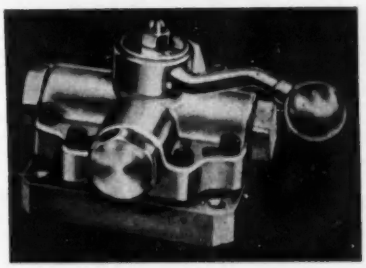
Circle 82 on postcard for more data

Warns of Vibration

THE Model 1 Vibraswitch is used for vibration measurement or as a protective device permanently installed on any rotating or vibrating machine. An internal SPDT snap switch may be wired into control circuits carrying up to five amp to actuate a warning or shut-down the machine the instant that the vibration exceeds normal by a preselected amount. The device is capable of actuation with vibratory displacement increase of less than 10 microinches at the most sensitive setting. Flat frequency response from zero to 200 cps (12,,000 rpm) is said to insure reliable results on high speed equipment. The device requires no power source or special auxiliary equipment. *The Beta Corp.*

Circle 83 on postcard for more data

Compact Valve



A poppet valve only two in. high with rotary handle action, called the Pancake, has been put into production. It has a bottom ported base and is available in ¼-in. and ⅜-in. pipe sizes. The valve is a four way unit and seals with air pressure. Pressure rating is 125 psig and the maximum recommended operating temperature is 175 F. This valve may be used for higher or lower pressures and for other than air services under special conditions. (Ross Operating Valve Co.)

Circle 84 on postcard for more data

Gas-Electric Lift

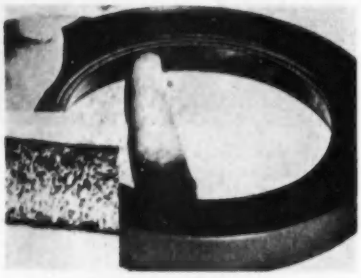
TWO gas-powered fork lift industrial trucks called the FD 50 and FD 60 are designed for use over rugged terrain. According to the maker the FD 50 rated for loads up to 5000 lb and the FD 60 rated for loads up to 6000 lb offer full economy through the unique electric transmission. Design features include worm gear drive, inching control, and variable voltage d-c generator integral with the engine. *Baker-Raulang Co.*

Circle 85 on postcard for more data



NEW PRODUCTS

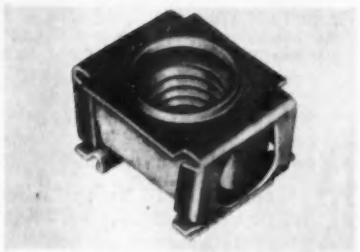
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89



Low Torque Leather Oil Seal

A leather oil seal now on the market is claimed to provide extremely low torque, cool operation, no measurable leakage and exceptional life even at 200 F. The Micro-Torc seal consists of a chrome-retanned leather sealing lip coated with a dry lubricant and elastomer material which renders walls of the sealing lip slick and smooth and impervious to lubricants. The center portion remains porous, thus permitting the sealing member to absorb and store lubricant, for starved or semi-starved sealing applications. Numerous 1000-hr tests showed that no seals tested leaked as much as 0.5 g per day, and 90 per cent of seals tested had no measurable leakage. *National Motor Bearing Co.*

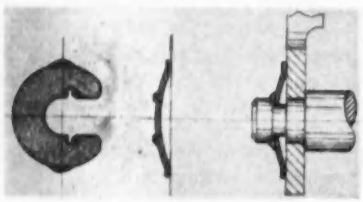
Circle 36 on postcard for more data



Self-Anchoring Nut Easily Installed

A T-shaped nut, made of high-grade steel and preassembled into a spring steel retaining cage, is the most recent addition to the Speed Grip line of nut retainers. The self-anchoring fastener is slipped into a panel hole by hand and anchor-locked in position with a hand tool. Once installed, it is said to be impossible to rotate the nut or drive it out of its spring steel enclosure. It is designed to withstand excessive torque and rough handling in production, according to the manufacturer, *Tinnerman Products, Inc.*

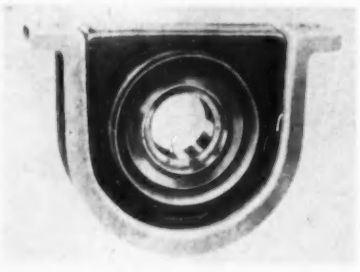
Circle 37 on postcard for more data



Retaining Ring Acts as Spring Shoulder

A radially-applied retaining ring can be locked positively in its groove and used as a shoulder and spring against rotating parts. Known as the Truarc series 5139, the fastener is made of spring steel and shaped like a bowed horseshoe. When fastened to a shaft it is locked in its groove by two prongs extending from the inner circumference of the open end. Sizes to fit ⅛ to ½-in. diam shafts are available, and other sizes will be offered. *Waldes Kohinoor, Inc.*

Circle 38 on postcard for more data



Shaft Mount Isolates Vibration

A center bearing mount for Spicer propeller shafts features low vibration transmission. This is accomplished with a flexible rubber retainer which has a low resonant frequency. The support flexes the rubber in shear, confining motion within the rubber. A sealed ball bearing and lightweight mounting made from stampings are other features. Sizes available match shafts of 1⅜, 1½, 1¾, and two-in. diameter, for passenger cars and trucks. Smaller sizes are available with either inverted sliding spline, or rigidly mounted end yoke or flange construction. Larger sizes are available with end yoke or flange construction only. *Spicer Mfg. Div., Dana Corp.*

Circle 39 on postcard for more data

Truck Floor Sections

Truck body fabricators are now offered a complete standard 61ST6 or 63ST6 aluminum floor package. The new extruded truck and trailer floor systems are designed specifically for dry van and refrigeration units. Both dry cargo and duct floor systems are available. The side sill initially has been developed for internally braced bodies with two-in. vertical side posts and 0.050-in. skin sheets. *Kaiser Aluminum.*

Circle 40 on postcard for more data

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

FREE LITERATURE

Flexible Sleeves 1

In bulletin SP-1 are illustrated 14 ways in which pliable boots and sleeves can be fabricated from two or more weights of materials, including water-tight zipper closures and various baked coatings. *A&A Manufacturing Co.*

Lift Truck Efficiency 2

A method for determining the times necessary for fork lift trucks to perform specific operations has been provided in a Work Kit of standard performance data, developed in a joint project by the Wharton School of the U. of Penna. and *The Yale & Towne Manufacturing Co.*

Delay Relays 3

A revised bulletin TD400 on their line of miniature hermetically-sealed time delay relays for either a-c or d-c units is available from *A. W. Haydon Co.*

Notes on Vibration 4

Said to be the first periodical devoted exclusively to shock, vibration and noise isolation, Shock and Vibration Control Notes is now being published quarterly by the *Barry Corp.*

Epoxy Resins 5

Three technical bulletins on Bakelite C-8 epoxy resins have recently been issued in six-page folders. These resins with the proper hardeners can be used in tooling, casting, laminating, potting, encapsulating, embedding and adhesive applications. *Bakelite Co.*

Machine Parts 6

Catalog No. 22 includes 341 items of special screws, nuts, studs, step blocks, etc., with all dimensions, prices and pertinent information. *Northwestern Tool & Engr. Co.*

Steel, Iron Castings 7

Up-to-date information on all types of gray iron and steel castings is offered in a 24-page book by *Campbell, Wyant and Cannon Foundry Co.*

Air Data Computer 8

An eight-page brochure on the Master Air Data Computer indicates that the unit provides a single coordinated source of information for aircraft control. Schematic diagrams show how the plug-in type computer permits calculation of complex functions with a minimum of equipment. *Servomechanisms, Inc.*

(*Please turn page*)

VOID After Nov. 15, 1954 9/15/54

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	

NAME ..... TITLE .....
(Please Print)

COMPANY OR BUSINESS .....

ADDRESS ..... (No. & STREET) ..... (CITY) ..... (ZONE) (STATE)

FIRST CLASS
Permit No. 36
(Sec. 34.9 P.L.&R.)
New York, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

Concrete Fire Test 9

Report of a fire test of precast concrete channel slabs for roof decking, made by Pittsburgh Testing Laboratory, is offered by *Precast Concrete Roof Deck Mfrs. Association.*

Tracer Control 10

Contour facing a jet engine rotor disk on the Dual Tracer lathe is pictured and described in Chip Tips No. 48. *Lodge & Shipley Co.*

Water Filters 11

Synclinal filters have recently been adapted to all models of the maker's sump and line type filters for water applications. Water Filter Catalog No. 300 is available. *Marvel Engineering Co.*

Yaw Damper 12

Automatic stability control is provided for high-performance aircraft with insufficient airframe damping, by the Model 1500 yaw damper. Illustrated booklet. *Lear, Inc.*

Rotary Swaging 13

The art of rotary swaging or reducing is discussed in the introduction to a new catalog of machines and services for this work. *Torrington Co.*

Leaded Steel 14

Ledloy (lead bearing steel) is described in bulletin 11-1 that gives chemical composition, mechanical properties, and case studies showing production increases up to 72 per cent when this steel was used in place of other free machining steels. *Joseph T. Ryerson & Son, Inc.*

USE THIS POSTCARD

Heat Transfer 15

A pictorial catalog, No. 148, its complete line of heat transfer equipment in all fields is available from *Young Radiator Co.*

Dial Feed Machine 16

Case histories of 12 users of automatic dial feed multi-spindle machines for drilling, tapping, milling, screw inserting and assembly are illustrated in a 28-page bulletin. *Bodine Corp.*

Special Drilling 17

A collection of applications for gearless drilling heads is available in an eight-page folder from *Zagar Tool, Inc.*

Parts Handling 18

The Drumvater false bottom for utility drums acts as a hand operated elevator to maintain the level of parts being removed from the drum by the operator. Specification sheet available. *Actron Engineering Co.*

Surface Broaches 19

Details and specifications of duplex vertical Hydro-Broach machines are given in a revised catalog M-1848, 12 pages. *Cincinnati Milling Machine Co.*

Centerless Grinding Wheels 20

Manhattan rubber-bonded centerless grinding wheels are described in bulletin No. 6925. Information on Manhattan regulating or feed wheels is included and a page is devoted to a simplified price list. *Manhattan Rubber Div., Raybestos-Manhattan, Inc.*

Blast Cleaning 21

A condensed 24-page catalog of an entire line of blast cleaning equipment and accessories has been provided with a special index which simplifies its use. All equipment and accessories are listed by equipment, by type, and by purpose. Bulletin No. 1210. *Pangborn Corp.*

Hydraulics Lectures

A color-slide lecture program is available on each of the following components: axial piston pumps and motors, vane pump/motors, directional valves, surge damping valves, flow controls and hydrostatic valves. For details write to *Marion Burton, Adv. Mgr., The Denison Engineering Co., 1236 Dublin Rd., Columbus, Ohio.*

FIRST CLASS
Permit No. 36
(Sec. 34.9 P.L.&R.)
New York, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES
P. O. Box 66,
Village Station,
New York 14, N. Y.

Readers Service Dept.

VOID After Nov. 15, 1954 9/15/54

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	

NAME ..... TITLE .....
(Please Print)

COMPANY OR BUSINESS .....

ADDRESS ..... (No. & STREET) ..... (CITY) ..... (ZONE) ..... (STATE)

HY-PRO SPECIALIZES IN PRODUCING TAPS!

...to save you time and money

Yes, we do specialize in tap production. To be exact, it makes up the bulk of our output. And because of this, our engineer specialists —in fact, our entire organization—concentrate their efforts on the design and perfection of one important line—Hy-Pro Taps.

Whatever your tapping needs may be—from a special design problem to advice on your present production setup—these Hy-Pro Engineer specialists are ready to work closely with you.

Call us today for full information about Hy-Pro's services. We offer you a complete line of taps, and with it the know-how that only specialization in one field can produce.



REG. U.S. PAT. OFF.
HY-PRO



HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

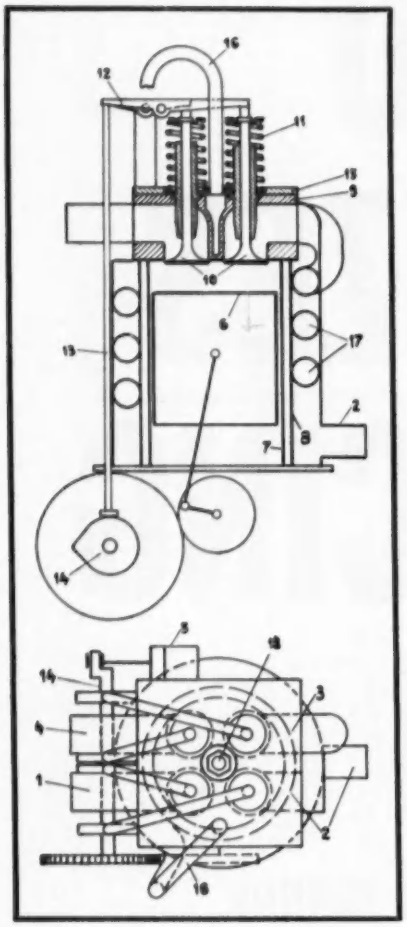
DISTRIBUTORS IN ALL LEADING CITIES

ADDITIONAL WAREHOUSES:

6046 College Ave.
OAKLAND 18, CALIF.
Piedmont 5-4337

10428 W. McNichols Rd.
DETROIT 21, MICH.
University 4-1077

6141 North Elston Ave.
CHICAGO, ILL.
Newcastle 1-6486



Six-Stroke Engine Tested in Switzerland

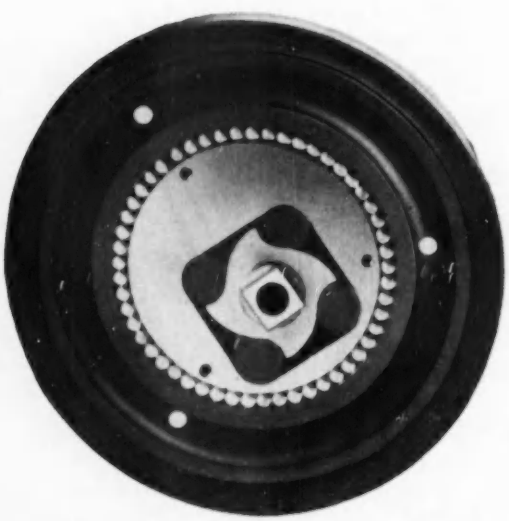
A NOVEL approach to the problem of reducing the octane requirement of an engine has reached the experimental stage in Switzerland. A prototype six-stroke cycle piston type engine has been built, using steam cooling. The first four strokes are conventional internal combustion; the fifth is for steam intake and the sixth for steam exhaust.

The diagram shows the two additional parts and valves for steam inlet and exhaust, marked Nos. 3 and 4 respectively. Steam inlet timing is 65 degrees. The steam is produced about equally by heat from the cylinder head and from the exhaust.

The engine has a displacement of about 30 cu in. and a compression ratio of 11 to 1. There is said to be no detonation using gasoline, kerosene or Diesel fuel, even at low speed and full load. Air-fuel ratio is increased, using steam cooling. With recirculation of the water, its consumption is said to be about 70 per cent of fuel consumption.

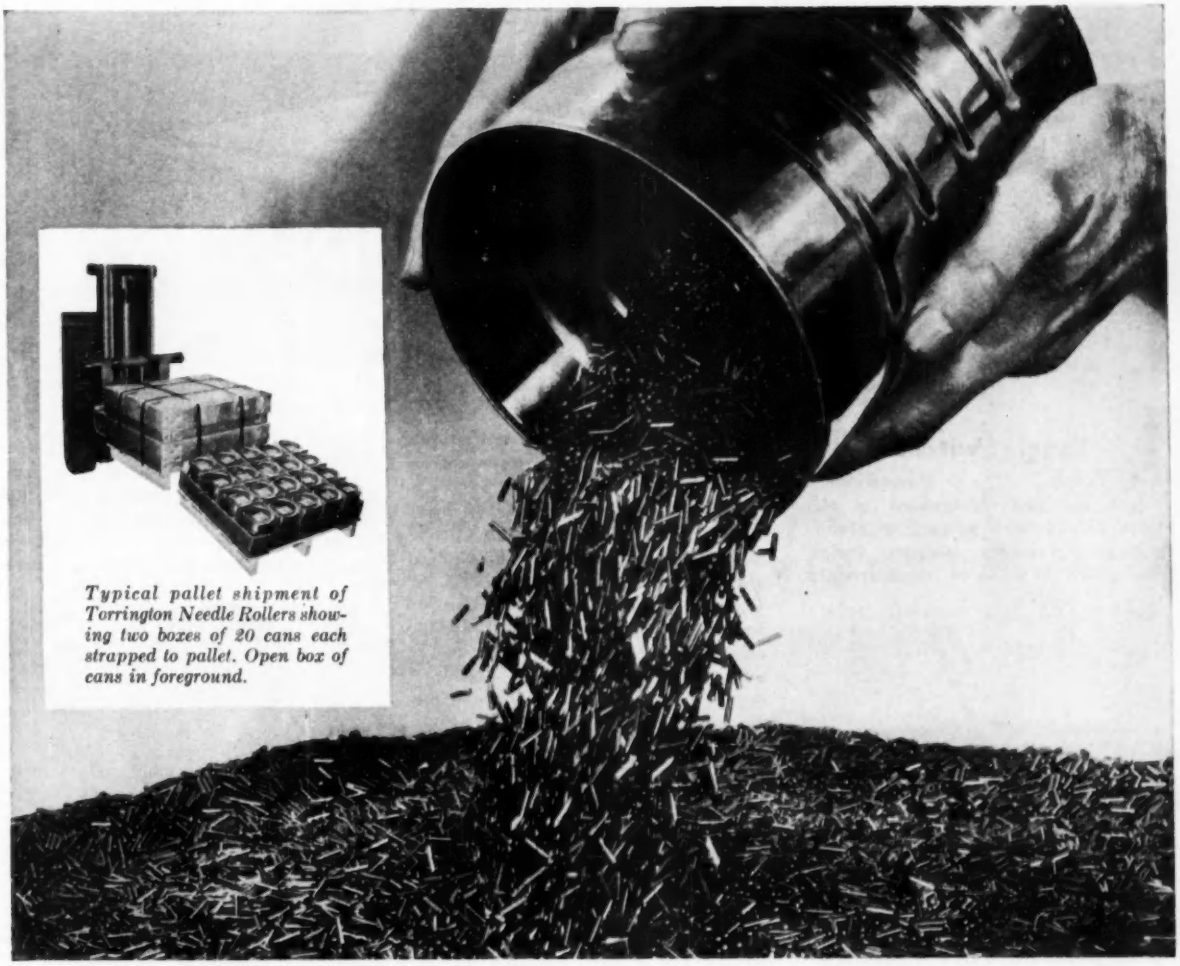
1. Intake manifold. 2. Exhaust manifold. 3. Steam inlet. 4. Steam exhaust. 5. Water pump. 6. Piston. 7. Cylinder. 8. Water jacket. 9. Cylinder head. 10. Valves. 11. Valve springs. 12. Rocker arm. 13. Pushrod. 14. Camshaft. 15. Steam cover. 16. Steam overflow. 17. Steam heating coils. 19. Spark plug.

Floating Hub Wheel



Floating hub wheel for industrial trucks

A NEW floating-hub wheel developed in England by Flexello Castors and Wheels Ltd. incorporates its own suspension and shock absorber. The square shaft carrying a cam-faced section is mounted rigidly on the axle. Four cylindrical rubber inserts separate the tapered surfaces from the offset square in the hub. Limited radial movement of the hub with progressive damping is thus permitted. The rubber-tired wheel rides on ball bearings with the rim of the hub as a race. Wheels up to 12 in. diam are now being made. While present applications are largely for industrial trucks, other uses are anticipated, in the not too distant future.



Typical pallet shipment of Torrington Needle Rollers showing two boxes of 20 cans each strapped to pallet. Open box of cans in foreground.

Torrington Needle Rollers—Vacuum-Packed for Cleanliness—Palletized for Easy Handling

Torrington Needle Rollers by the millions are now being vacuum-packed in tin cans to protect them from dirt, moisture and damage. The foods you eat are not packed with greater care.

This new vacuum pack permits us to send you rollers *dry*—free from oil or grease—so that they can go into your loading machines direct from the can, without time-consuming degreasing.

To make shipping and handling easier, we pack these cans 20 to a carton and strap two cartons to an expendable wooden pallet, for a total weight of about 1500 lbs. per pallet. This makes an easy load for your fork lift trucks to handle and store.

Torrington Needle Rollers deserve this special vacuum pack. They're precision rollers made under statistical quality controls of extraordinary rigor. Every step from alloy selection to polishing and packing is carefully checked to assure you that every can of rollers you receive meets your high standards. And to help you use these rollers to best advantage, Torrington's engineering staff is always available to assist in application design and testing.

Always specify Torrington for precision Needle Rollers in prime condition. In stock for immediate volume shipment.

THE TORRINGTON COMPANY

Torrington, Conn. South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON NEEDLE BEARINGS

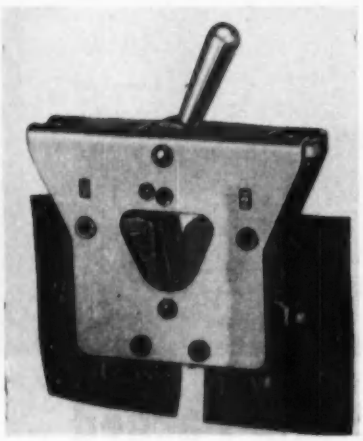
Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Toggle Switches

A family of six three-position toggle switches, designated as the 11AT family, have as their outstanding characteristics compact design and ability to make or break circuits



in all three toggle lever positions. The latter is made possible by the use of two single-pole, double-throw basic switching units in each switch.

External dimensions of the switches are the same. Variations are in the combinations of momentary and detented toggle lever positions and in the fact that three models have standard AN-3234-1 basic switching while three are assembled with special impact resistant, high strength plastic cased basic switching units.

Maintained toggle lever positions have a positive detent. In the momentary positions the toggle lever automatically returns to neutral as soon as pressure is released.

In each toggle switch there are two single-pole, double-throw basic switching units. One unit is actuated in each extreme toggle lever position. Neither unit is actuated in the center, or neutral, toggle lever position. However, use of the single-pole, double throw basic switching units affords many different circuit combinations, including the making or breaking of circuits in all three lever positions.

The electrical rating of the basic switching units in these toggle switches is: 30 v dc, inductive—10 amp at sea level, six amp at 50,000 ft; resistive — 10 amp; motor load — six amp. They are Underwriters' Laboratories listed for 10 amp 125 or 250 v ac, ½ amp 125 v dc, ¼ amp 250 v dc. *Micro Switch Div., Minneapolis-Honeywell Regulator Co.*

Circle 46 on postcard for more data

Titanium Rivets

Hi-Shear rivets, or threadless bolts, manufactured from C-130AM titanium alloy, offer a 40 per cent weight saving over the same rivets in alloy steel. They have a minimum shear strength of 95,000 psi, and can replace the high-heat-treat alloy steel rivets without decreasing structural strength. No protective finish or lubrication is necessary, according to the maker. They also retain useful strength at elevated temperatures from 800 to 1800 F. *Pheoll Mfg. Co.*

Circle 47 on postcard for more data

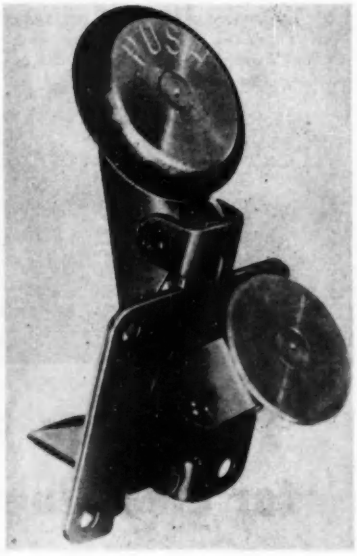
Titanium Fasteners

Standard and special titanium fasteners in production quantities are now available. Alloy RC 130B is a special wire composed of 92 per cent titanium, four per cent aluminum and four per cent manganese. The maker can produce parts from this material with tensile strengths of 150,000 psi, minimum, and shear strengths of 95,000 psi, minimum. This metal can withstand temperatures up to 800 F. The alloy weighs approximately 44 per cent less than alloy steels of corresponding strength, and is reported to have withstood 250 hr of salt spray without evidence of corrosion. *Camcar Screw & Mfg. Corp.*

Circle 48 on postcard for more data

Flush Latch

An improved series of flush latches designed for fast opening and closing of inspection and access doors has been developed. The latch employs the toggle action movement to assure



positive door closing. Once closed doors can be accidentally opened only by forces strong enough to cause structural damage, yet fingertip pressure only will open the latch. The latch button can be used as a handle for opening and closing. Improved rubber gaskets around the latch opening are said to make the latch splashproof, moisture resistant, and dust proof.

Weighing only one oz, the device is constructed of stainless steel. The latch is attached to doors with four ⅛-in. diam rivets. Overall length of the latch is 3⅛ in. Latches stocked can accommodate a wide range of thicknesses and doors, according to information from the manufacturer, *Modern Aviation Co.*

Circle 49 on postcard for more data

Sealed Power

Leading Manufacturers of Chrome Rings



28 leading engine builders use Sealed Power CHROME Rings



Sealed Power Piston Rings

Leading producer of Automatic Transmission Rings, Power-Steering Rings, and Non-Spin Oil Rings

The BUSINESS PULSE

Tendency of Consumers to Use an Increasing Proportion of Current Income Boosts Personal Consumption Expenditures to New High Rate. Merchants Expect Sales During Autumn to Exceed Those of Fall of 1953.

This Survey is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York

Conditions Stabilized

The dominant tendency of business during the summer months was one of sideward drift. In a few industries—steel being the most notable—performance was mildly disappointing. The general picture, however, after allowance is made for seasonal influences, was one of limited fluctuation at approximately second-quarter levels.

On balance, this behavior has been gratifying in the sense that it adds further weight to the belief that the business decline has run its course. It can be disappointing only to those who had been expecting an early emergence of expansionary forces. And it is unlikely that this group is very large in number, since there never was much prospect that revival would take hold during the phase of summer listlessness. From a realistic standpoint, it has been pretty evident all along that the real test would not come until after Labor Day.

The trend of business during the summer was particularly encouraging with regard to labor-market conditions. These remained comparatively stable, whereas earlier it had been feared that the addition to the labor force of graduating students and seasonal workers would be a disruptive influence. The record shows that, despite the influx since May of approximately 2.5 million students alone, there has been no rise in the unemployment total.

Jobless Total Unchanged

Thus, according to Census Bureau estimates, the jobless total remained unchanged in July at about 3.3 million for the third consecutive month. This amounted to 5.1 per cent of the civilian labor force, the same as in May and June but substantially below the 5.8 per cent mark that obtained in February and March. Particularly noteworthy is the fact that the number of relatively long-term unemployed (those out of work 15 weeks or longer) was appreciably smaller in the summer period than in the early part of the year and also that the proportion of jobless male workers 25 years old and over was significantly smaller at mid-year than it was earlier.

Spending Habits

Consumers gave a good demonstration during the second quarter of how much leverage they can exert on economic affairs by changing their spending habits. On a seasonally adjusted basis, personal consumption expenditures rose to an all-time peak annual rate of $233 billion in that period, $2½ billion more than in the preceding three months. This increase occurred despite the fact that the wherewithal to buy—disposable income—is estimated to have risen by only $600 million, less than one-fourth as much as expenditures. The higher consumption total came about, therefore, almost entirely as a consequence of a tendency on the part of consumers to spend an increasing proportion of current income, or, what is the same thing, to save a decreasing proportion. Specifically, savings fell off from a first-quarter rate of 8.6 per cent of disposable income to 7.8 per cent in the second quarter. The dollar amount of savings fell off to an estimated annual rate of $19.7 billion, more than $2 billion less than in the first three months of the year.

Significantly, gross national product showed a slight increase for the quarter as a consequence of the rise in consumption expenditures. If consumption expenditures had not risen—that is, if savings had not declined—gross national product would actually have decreased because of the continuing decline in governmental outlays.

All three categories of personal consumption expenditures—durables, nondurables, and services—registered advances in the second quarter. Service outlay has been on the rise all along, so behavior in this category came as no surprise. But since nondurables had been sluggish earlier, while durables had been sagging, improvement in these two sectors was gratifying.

(*Turn to page* 184, *please*)

more dependable starting *under all operating conditions*



"No Kick-Out" feature sets new standards in starting performance.

●Since the earliest days of the automotive industry Bendix* Starter Drives have been noted for reliable starting.

Now with the new and latest Bendix Folo-Thru Starter Drive, starting, even under the most adverse weather conditions, has been improved immeasurably.

Although this new Bendix Starter Drive is fundamentally similar to its illustrious predecessors, it is specially designed to follow through the weak explosions until the engine actually runs on its own power.

That's why cars, trucks and buses equipped with the Bendix Folo-Thru Drive are easier and quicker to start under all operating conditions.

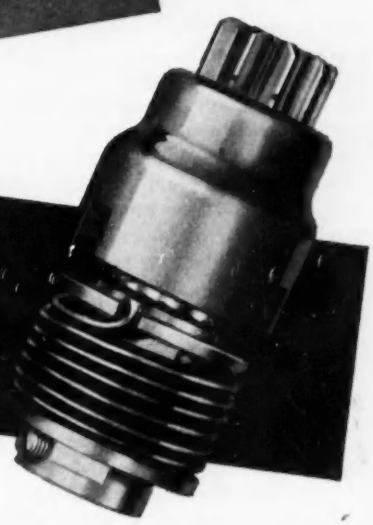
*REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISON OF Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

Bendix folo-thru starter drive



costs less —*The new Folo-Thru Drive requires no actuating linkage and the less expensive solenoid may be placed in any convenient position. Results are lower installation costs and no adjustments. Complete detailed information is available on request.*

Bendix* Folo-Thru Starter Drive **Bendix* Automotive Electric Fuel Pump** **Stromberg* Aerosquad Carburetor**

AIR BRIEFS

By ROBERT McLARREN

U.S. Jet Transport Production

Regular readers of this column have followed the month-by-month gyrations of the U. S. jet transport history of the past several years and the battle has now been won with a volume production contract for the Boeing jet transport. Just as everybody guessed long ago, the first customer is the U. S. Air Force, which has ordered 88 of the giant four-jet transports as jet tankers, the Model 717 Jet Stratotanker. Initial order is for 29 of the craft with fiscal 1955 funds and a commitment for 59 more out of fiscal 1956 money. The Air Force version will be longer and heavier than the prototype 707 now flying in order to accommodate more fuselage fuel capacity for the in-flight refueling function. This initial quantity production order will increase Boeing's lead in the jet transport race from two years to about four years and place the company in a virtually unassailable position as prime source of commercial jet transports for U. S. airlines in the 1956-58 period.

Turboprop Transport

Simultaneously, the U. S. now has its first transport designed expressly for turboprop power in the air with the successful first flight of the Lockheed YC-130 from Burbank to Edwards Air Force Base, Calif. The utilitarian Lockheed is powered by four Allison T56 gas turbine engines driving propellers and is the first of a quantity production order by the Air Force for the heavy cargo transport, which features heavily-reinforced flooring, huge tail-loading ramp and other special features for delivering such bulky items as bulldozers, tanks and trucks. Lockheed enthusiastically points out the commercial cargo features of the new plane and its low operating cost, despite its high performance, and two years of military production at its Marietta, Ga., plant will place the company in a position to offer commercial versions at a competitive price and delivery schedule.

Faster Helicopters

U. S. helicopter designers are inching up on the "blade stall" barrier in which forward speed is limited —regardless of size—by stalling of the blades on the "downwind" portion of the stroke, and the old theoretical limit of about 130 mph has now been raised to 156 mph, a new speed record set by the Sikorsky XH-39 machine. This new design is powered by a French Turbomeca Artouste II, a shaft-power gas turbine unit developing 400 hp at 34,000 rpm. The engine is licensed to Continental Aviation and Engineering Corp. for production as the T51 for the Air Force. The new record is a subsantial increase over the previous figure of 146.735 mph set a year ago by a piston-engine Piasecki model and reflects the increasing potentialities of the gas turbine power plant for the helicopter.

Fighter Fashions

Grumman Aircraft Engineering Co. has made the latest breakthrough in the supersonic aircraft design battle by borrowing the shape of the familiar "Coke bottle" for the fuselage of its new F9F-9 Tiger carrier jet fighter. The shape is due for incorporation on a whole family of new Air Force and Navy fighter planes because it produces a 15-25 per cent reduction in drag through the transonic speed range. The shape is determined by a newly developed aerodynamic theory in which the rate-of-increase of the fuselage area, proceeding aft from the nose, is maintained at a constant. Thus, when the ratio meets the leading edge of the wing, the frontal area of the wing is subtracted by cutting out a liberal chunk of the fuselage in exact equivalent, thereby maintaining the ratio all the way to the wing trailing edge. This "Marilyn Monroe" shape, as the designers call it, enables the new Grumman fighter to fly at supersonic speed in level flight using only a Wright J65 engine of 7500 lb of thrust, whereas the other aircraft capable of such performance need the full 12,500 lb of the P&W J57 with afterburner to accomplish the feat.

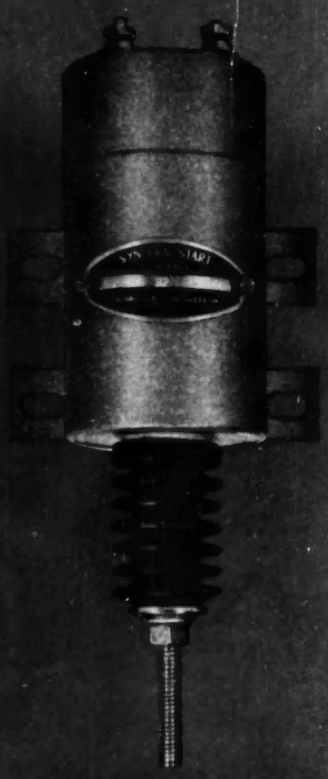
Airline Radar

United Air Lines has decided to equip its entire fleet of transports with airborne radar at a cost of $4 million. Mounted in the nose, the radar units will give continuous indications of thunderstorms, rain or snow within a 50-mile radius from the airplane. United has also ordered an additional 10 Douglas DC-6B and two Douglas DC-7 passenger transports plus five Douglas DC-6A cargo planes in a $25 million equipment expansion program. The new planes will also incorporate the new radar units.

(*Turn to page* 188, *please*)

Continuous Duty - D.C.

SOLENOIDS



Synchro-Start MODEL SD is a heavy duty solenoid with an exceptional amount of power over a long stroke. It is fully enclosed in a sealed casing to protect it from infiltration of dust and liquids.

VOLTAGE: SD Solenoids can be furnished in all standard and special voltages up to 115 Volts D. C.

PULL: 10 lbs. over 1½ inch stroke.

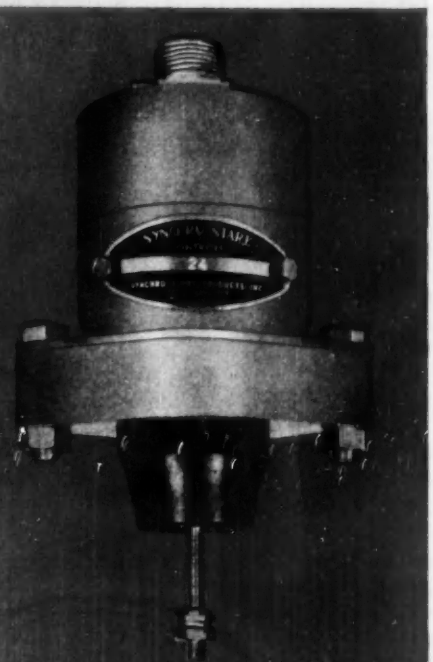
POWER CONSUMPTION: 550 Watts pulling and 8 Watts holding.

HOUSING DIMENSIONS: 4⅝" x 2½".

To meet special requirements, this solenoid can be furnished with a standard aircraft type A N Connector (Model SD-A).

Synchro-Start MODEL SS-AB Solenoid combines the features of the A N Connector plus a sealing boot. The boot is made of a grease and oil resistant, synthetic rubber protecting the solenoid from any seepage around the shaft.

These solenoids may be ordered with standard terminal screws (Model SS-B), without the boot (Model SS-A), or standard without boot (Model SS).



Synchro-Start Products Inc.

8151 N. RIDGEWAY AVE.
SKOKIE, ILLINOIS

AMA Report on Air Pollution Given at SAE West Coast Meeting

By R. Raymond Kay

EXPERIENCES with new designs in steering and fuel systems were presented in mid-August at the annual SAE National West Coast Meeting in Los Angeles. Multi-grade lubricants, combustion, and fleet maintenance were also the subjects of weli prepared papers.

Research aimed at cleaner automotive exhausts—and a probable by-product of still more miles per gallon—is under way throughout the industry, according to John M. Campbell, chairman, Vehicle Combustion Products sub-committee of the Automobile Manufacturers Assn. Campbell reported on the "considerable" program through which the industry is joining in the attack on urban air pollution. He noted that years of effort had not yet produced a fully practical exhaust "strainer," but that improvement in combustion efficiency had already cut exhaust emissions by one-third in the past 25 years.

"Although we see no cause for alarm in the present situation, we believe that substantial further progress can be made as new information becomes available . . . I believe that engineering studies will indicate where certain adjustments can be made . . . that will improve overall combustion efficiency," Campbell told the meeting.

"True Center-Point Steering," by A. S. Page, Page & Page Co., Portland, Ore., covered the development of a true geometric pattern in steering, producing true rolling motion of the tires with necessity for camber eliminated by imposing the pivot point and wheel centerline one on the other.

We have attained complete irreversibility of steering forces, Page said. "Since all road shock or sudden drag on the tires is transmitted directly through the pivot points to the axle beam, it has no effect on the operator of the vehicle, allowing complete and safe control at all times. This also produces easier steering and less driver fatigue—not to mention reduced tire wear and great reduction of wear in the axle itself, particularly in the linkage parts, by reducing the loads imposed on them."

The new Cummins PT Diesel fuel system was described in detail by C. R. Boll and J. W. Rowell, Cummins Engine Co. In an interesting presentation they told how the company reduced the number of parts in their fuel system by more than 50 per cent, reduced the weight by 60 per cent, and simplified the pump and injector functions. An article devoted to this new fuel system appeared in AI, September 1, page 58.

Applications of power steering to trucks is promoting safety, improving operating flexibility, and increasing payloads, R. A. Garrison, Garrison Mfg. Co., Los Angeles, reported. He said payload gains already have reached 3500 lb, and suggested that further gains might be achieved by increasing tire capacity.

Current engineering discussion concerns the degree of steering effort desired, and the relative merits of various types of equipment, since each type presents an application problem. "Air steering does present some installation and power limitations in that the source of power is within the range of air compressors," Garrison explained, "while hydraulic power offers a power source of 750-900 psi and, as a result, cylinder sizes may be reduced."

H. V. Nutt, U. S. Naval Engineering Experiment Station; E. W. Landen, Caterpillar Tractor Co.; and J. A. Edgar, Shell Oil Co., presented a joint-prepared paper, "The Effect of Surface Temperature on the Wear of Diesel Engine Cylinders and Piston Rings." Contact wear of cylinders and pistons in Diesel engines occurs when the cylinder oil film fails to keep the parts separated. Low oil volatility is essential to adequate cylinder lubrication because it assures that a viscous film will survive the flash evaporation on the cylinder at each power stroke, and so prevent contact wear.

Contact wear is most prevalent, they explained, when engine loads are high and surfaces are hot, conditions which minimize the thickness of the film of lubricant. They said oil's viscosity at high temperature is an imperfect indicator of ability to prevent contact wear, whereas volatility can be a reasonably good guide.

"An ordinary set of pistons and rings is an extraordinary engineering achievement. It must prevent the leakage of white-hot gas at 1500 psi and, also, must be a liquid-metering device of meticulous precision while operating under inertia loads 200 times the force of gravity."

Combustion knock still is limiting the power and

(*Continued on page* 138)



MORE *GO* FOR YOUR MONEY

Designed and engineered to be the finest you can buy, Aetna bearings and parts give you real economy through highest quality . . . help your products deliver more "go," more efficiency, longer life, greater satisfaction to the user. Choose from our complete line of standard ball thrust bearings (catalog on request) or send us your blueprints if your requirements involve special bearings or hard-to-make precision parts. Engineering assistance, experimental work and quotations promptly rendered without obligation.

Aetna

AETNA BALL AND ROLLER BEARING COMPANY

DIVISION OF PARKERSBURG-AETNA CORPORATION

4600 Schubert Avenue • Chicago 39, Illinois

In Detroit — Sam T. Keller — 2457 Woodward Avenue

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings • Miscellaneous Precision Parts

Automotive Industry is Key to Russian Mobilization Plans

(*Continued from Page* 63)

large portion of the materials and equipment are allocated on the basis of plans prepared by *Gosplan* of the USSR, and approved by the government. The system of supply distribution is called "funded," and such supplies are called "funded" materials and equipment. Funded commodities, because of great scarcity and importance, are not sold directly by their producers, but are distributed in accordance with a plan by the central government among the industrial ministries and their departments. The plan of allocation is prepared on the basis of requisitions supplied by the individual enterprises. In accordance with the edict of the Supreme Soviet of the USSR of February 10, 1941, the government requires strict adherence to the specified use of these allocations, and may take severe disciplinary measures in case of the unlawful use of any of the funded commodities. Funded materials and equipment are allocated to the ministries (in two major categories), each having a specified amount for a particular use: production and capital construction. Within the allocated materials for primary production purposes is included a separate allocation for by-product production (for shops producing consumers' goods).

Less scarce and less important materials are called "centralized." These are supplied directly by the ministries producing them to any other ministry for distribution to subordinate individual users, in accordance with their requisitions.

A third group of supply materials is called "unfunded" or "decentralized" materials. These may be procured by ministries, and their subordinated organizations from cooperatives and local industrial plants, and are supplied in small quantities as unfunded or decentralized purchases.

The standard official classification of the funded, centralized and unfunded or decentralized materials and equipment is prepared by *Gosplan* and approved by the government annually and reviewed every quarter. However, these designations are not of a permanent nature, but vary in accordance with the particular tasks facing the national economy, i.e., with the relative importance of the various kinds of production in a given planning period. Changes in the official classification must thus have the approval of the government.

The movement of products from plant-producers to plant-consumers is realized through a centralized system of supply and distributing organizations handling the purchase and sales of materials and equipment. The organ procuring supplies is called the Chief Administration of Supply, and the one responsible for sale and distribution is called the Chief Administration for Sale of Products. There are *Glavsnaby* under the Council of Ministers of the USSR (Chief Administration of Oil Supply, Chief Administration of Coal Supply and Chief Administration of Timber Supply), with regional administrations, offices and local agencies. Each Ministry has its own Chief

Specialized Service

IN AUTOMOTIVE PROTECTION AND SAFETY

United Specialties Company produces a variety of steel-processed products for the automotive and other industries that contribute materially to improved performance, economy and satisfaction.



Combination Oil Bath Air Cleaner and Silencer for use on down-draft carburetors.

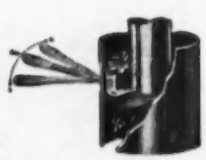


Plastic pre-cleaner is easily attached — has a transparent dust chamber — reduces air cleaner servicing frequency — saves oil — fits practically any center tube air cleaner.

UNITED AIR CLEANER DIVISION

Oil Bath Air Cleaners — United manufactures a complete line of oil bath air cleaners for protection of engines in trucks, busses, tractors, cars, stationary or portable power units — a range of models to fit every type of internal combustion engine including diesels. United has designed and built almost 20 million air cleaner units.

Our sales engineers will give prompt attention to your inquiries.



Concealed type, six-wire turn signal switch. Uses regular front and rear park or stop lights. Signal is self-cancelling.



Conventional type ignition switch used on popular makes of cars and trucks.

MITCHELL DIVISION

Semi-Automatic, Self-Cancelling Turn Signal Switch built by Mitchell is standard equipment on many cars and trucks.

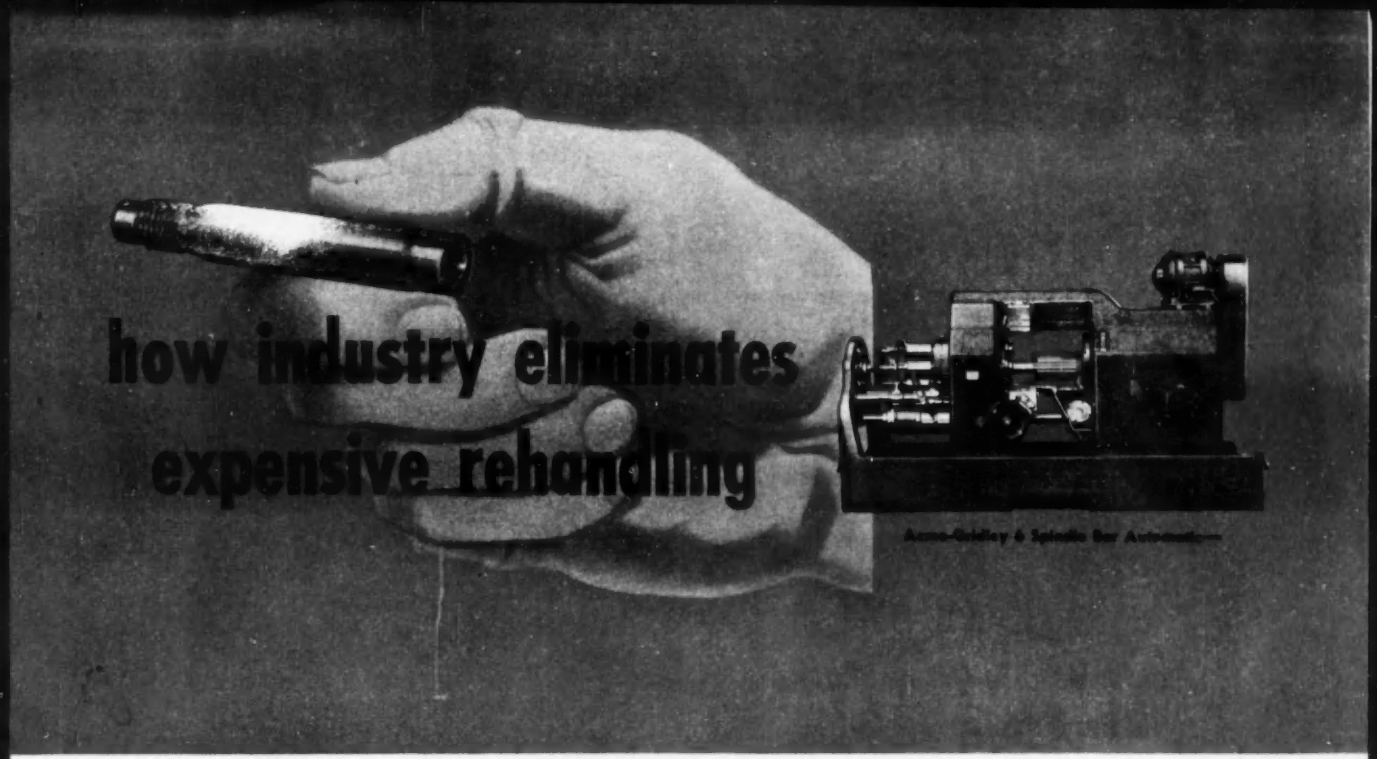
Mitchell Ignition Switch has an industry-wide reputation for dependability and extra long life. "Radio" position reduces battery drain with motor off.

Rolled Shapes, stampings and dovetails are offered by Mitchell in a complete range of metals, gauges and designs.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION — CHICAGO 28

MITCHELL DIVISION — PHILADELPHIA 36 • BIRMINGHAM 11, ALABAMA



with ACME-GRIDLEY Bar Automatics

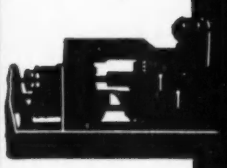
Whether you "automate" or pick 'em up with your fingers, you're going to have a certain amount of handling in making any product. But, the less *re*handling—the faster the job is done and the lower the cost per piece.

That is why more and more manufacturers are getting more operations on their primary machining equipment. It's also why, every day, more intricate parts like these—and larger ones, too—are being *completed in one setup* on multiple spindle Acme-Gridley bar machines.

Ingenious tooling of these versatile machines with standard National Acme toolholders and attachments often eliminates second operation work entirely—saves not only handling, but also extra machines, floor space and valuable man-hours. And in addition, the parts are more accurate because you don't have to re-chuck.

Check your machining methods today—then ask your engineers and ours to talk it over.

Remember—the biggest help to your competition is your continued use of obsolete equipment.



The NATIONAL
ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.

ON JOBS LIKE THESE



DRILLED STUD $\frac{3}{8}$" diameter, $2\frac{1}{4}$" long.
MATERIAL: B-1113 CD Steel.
OPERATIONS: 12 including rolled thread and spindle stopper for cross drilling to blind hole.
MACHINE TIME: 9 seconds (400 completed pieces per hour.)
(Formerly done in two setups)

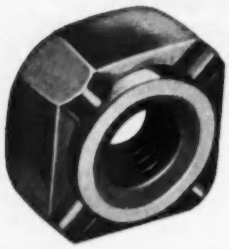


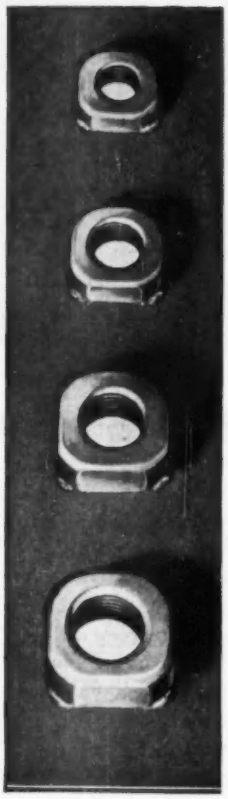
WORM $\frac{3}{8}$" diameter, $1\frac{3}{4}$" long.
MATERIAL: B-1113 CD Steel.
OPERATIONS: 9 including machining the worm and broaching end of piece.
MACHINE TIME: 8 seconds (450 per hour.)
(Formerly done in three setups)

Ask for Catalog M-450

For Speedy... Economical Assembly

SPECIFY MIDLAND Welding Nuts





Ideal for Hard-To-Get-At Places ...Will Not Work Loose or Rattle!

Whether you're designing a product or building it, the Midland Welding Nut is the answer to the problem of accurately and securely fastening metal parts into a main assembly . . . speedily, economically.

It is welded to the parts so that a bolt can be turned into it without the need for any device to hold it and keep it from turning.

This frequently means that one man can do the work of two, for with an ordinary bolt and nut one man usually has to hold the nut in place while a second man turns the bolt into it.

Midland Welding Nuts are perfect, too, for those hard-to-get-at places in assembly operations. Welded in advance to those inside spots where it is difficult —or *impossible*—for hands or tools to reach, Midland Welding Nuts hold fast while bolts are turned into them.

Write or phone for complete information *today!*



ENGINE MOUNT

The MIDLAND STEEL PRODUCTS COMPANY
6660 Mt. Elliott Avenue • Detroit 11, Michigan
Export Department: 38 Pearl St., New York, N.Y.

Manufacturers of

AUTOMOBILE AND TRUCK FRAMES | AIR AND VACUUM POWER BRAKES | AIR AND ELECTRO-PNEUMATIC DOOR CONTROLS

Administration of Automobile Supply, Chief Administration of Tractor Supply under the Ministry of Medium Machine Building and divisions in the *Glavki*, trusts and in each enterprise which it administers. The system of sales in each industry is handled by the industrial branch *Glavsyty* which is functionally subordinated to the Council of Ministers and administratively to the Ministry. Each *Glavsbyt* has its own regional offices, depots and warehouses, with sales organs in each enterprise.

There are two terms used to describe the two methods of distribution of materials from producers to consumers in the Soviet Union: "transit" and "storage." The term "transit" is applied to the movement of materials directly from producer enterprise to consumer enterprise.

The term "storage" is used when referring to the movement of commodities from producer enterprises to the storage depots and warehouses of the supply and distribution organizations, and from those to consumer enterprises.

The automotive industry, due to the great number of materials used (more than 2000 different kinds comprising a total of over 20,000 items), utilizes both types of movement of supplies: "transit" and "storage." Because of the development of interplant *kooperirovanie* in the automotive industry, the "transit" method of distribution is the prevailing one, and the present tendency is to strengthen its use.

From the point of view of organization of production and composition of plants, the major distinguishing characteristics of the present Soviet automotive primary-producer plants may be summarized as follows: (a) poorly developed industrial coordination, (b) well developed servicing processes, principally in the instruments and repair departments; and (c) a high degree of mechanization of production processes.

Poor industrial coordination in the Soviet automotive industry is largely due to lack of experience in this field, insufficiently developed transportation facilities, inefficient handling of the system of supply and distribution of production, and lack of personal interest on the part of the personnel in the primary and components-producer plants. There are a number of other more complex reasons related to the social and political situations of the Soviety Union.

Due to the continued dearth of machine tools in Soviet industry, it is



Fig. 1

producing this pulley assembly shows off the versatility of Hydroforming



Fig. 2

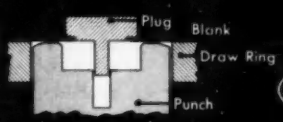


Fig. 3



Fig. 4



Fig. 5

In addition to drawing simple or intricate shapes, the Cincinnati Hydroform accomplishes simultaneously what are considered conventional *die set* operations. This is illustrated by the ingenious method used to produce the forming operations for the experimental short run pulley assembly shown in Fig. 1.

The pulley flange section (Fig. 2) was Hydroformed complete in *one* operation from a flat, 8″ dia. blank of 0.062″ cold rolled steel having a 2½″ dia. center hole. The walled hole was produced at the same time as the balance of the part by use of a piloted plug which formed the material into a recess in the punch. (See Fig. 3.)

The hub flange section (Fig. 4) was produced in *two* operations. The hub was first drawn using conventional Hydroform tools—a punch and draw ring. In the second operation, a ring was used to form the balance of the part. (See Fig. 5.) This combined a forming and a restriking operation which produced the required dimensional accuracy, including the sharp 0.060″ compound radii on the flange.

Thus the Hydroform can often be tooled inexpensively to do *more* than deep drawing and forming, saving operations which *further reduce* the cost of your development work . . . or your short run parts production. Let a Cincinnati Milling field engineer give you complete details. General Hydroform data and specifications of the 8″, 12″, 19″, 23″, 26″ and 32″ machine sizes are given in Bulletin M-1759-2. Write for your copy.

CINCINNATI **Hydroform** **THE CINCINNATI MILLING MACHINE CO.**
CINCINNATI 9, OHIO, U.S.A.

impossible to organize a system of standardization of tools as is possible in American plants. Consequently, the entire process of repairing machinery and plant equipment has to be organized in special (often extensive) machine repair shops developed within the plants. For the same reason many primary-producer plants have developed within their plants their own production of not only special instruments, but also of standardized tools.

The striving for maximum mechanization of technological processes may be explained by the desire not only of increased labor productivity, lightened human drudgery, and minimizing the human influence on the final output of the product, but also to reduce the number of production workers. Despite the fact that labor in the USSR has always been considered as one of the cheapest elements in the total production cost, the aim of the Soviet government to lower the coefficient of the number of employed workers to the number of units of output, does not appear to be paradoxical.

The fact is that the Soviet Union, with its high tempo of industrialization and relatively lower labor productivity (in comparison with that in the United States) is always short of manpower. The major reason for mechanization, then, is that it would release considerable numbers of workers for the armed forces, without affecting the relative efficiency of production.

However, the attempt to maximize mechanization may be viewed as the Achilles' heel of Soviet industry, since such a program would at the same time increase industry's vulnerability to attack. The damage that might be wrought during war time to a single relatively insignificant part of an automatic production line would bring about a complete standstill in the output of the product manufactured on that line. With the scarcity of spare parts constantly in existence, the output of the given product would be delayed for a considerable period of time until the damaged part of the automatic line was repaired. To avoid such a situation, the plant would have to have extrordinarily large inventories of materials and spare parts to last at least several weeks. This would in its turn bring about a "freezing" of large amounts of raw materials, semi-fabricated products and finished parts, as well as a number of other technological shortages. On the other hand, should damage occur simultaneously to the automatic production line or a part of it, and to its storage area, then the stoppages to the output of the finished product would be complete.

Mechanization of production processes in the Soviet automotive industry is based on the following developmental lines:

a. The creation of separate automatic machines having one or more operations; the role of the worker consists solely in setting the machine and controlling its operation, thus allowing one man to take care of several pieces of equipment.

b. The establishment of "aggregate" machines combining several more or less complex operations (formerly performed on separate machines) into one continuous technological) process, and automatically placing and transferring the processed parts at the end of each cycle.

c. The development of automatic, continuous lines on which all operations and processes of machining are performed in full, from beginning to end, automatically, including the

(*Turn to page* 111, *please*)



DEPENDABILITY IS COMBINED WITH LOW WEIGHT IN

★ Lamb Electric SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

The wide use of Lamb Electric Motors in aircraft components, home appliances, portable electric tools and other portable devices is impressive evidence of the fact that they combine thorough dependability with low weight.

To obtain these and the other advantages of Lamb Electric specially engineered motors, it is important that the motor be considered while the product is still in the design stage.

The Lamb Electric Company Kent, Ohio

In Canada: Lamb Electric — Division of Sangamo Company Ltd.— Leaside, Ontario

THEY'RE POWERING AMERICA'S *Finest* PRODUCTS

Lamb Electric SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

Production Pointers from GISHOLT

TIME-SAVING IDEAS



Presented as a service to production men, we hope some of these interesting ideas, chosen from thousands of jobs, will suggest ways to help you cut time and costs in your own work.

SAVING TIME ON 6 TYPES—AND 24 SIZES

No. 24 Hydraulic Automatic Lathe with Hydraulic Tracer Unit Speeds Output of Bearing Races

Put new zip and lower costs into bearing race production with *six* different types and *24* varying sizes? And do the whole job on only *one* machine? Sounds like quite an order, doesn't it?

It's really a pushover with the No. 24 Hydraulic Automatic Lathe—equipped with the Gisholt Hydraulic Tracer Unit. This user shows how inner and outer bearing races requiring spherical, straight or tapered bores can be handled with speed and ease.

In the first operation, longitudinal movement of the front carriage and transverse movement of the standard slide permit tools to turn the O.D. up to the chuck jaws and face the forgings. The longitudinal movement of the rear carriage carries the tooling toward the spindle, and the template-controlled Hydraulic Tracer Unit actuates the rear slide, causing tools to rough-generate the spherical bore (for this typical 18" O.D. part) and break the corners at the end of the cut.

Tracer Unit Holds Fine Tolerances

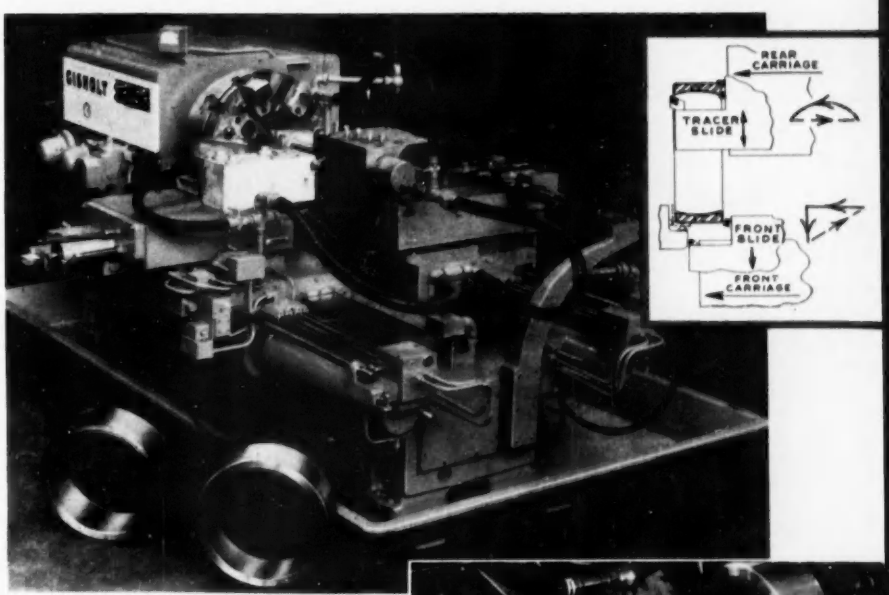
For the second operation the template is quickly re-located and the stops changed. Tools on the front slide finish turn the O.D. and face the other side. Tools on the tracer-controlled rear slide finish-generate the spherical bore, holding a .0005" tolerance, and then break the corners.

Each operation takes just 8 minutes f.t.f. with 90 lb. of tough bearing steel removed in less than 16 minutes total machining time. That's really knocking 'em out!

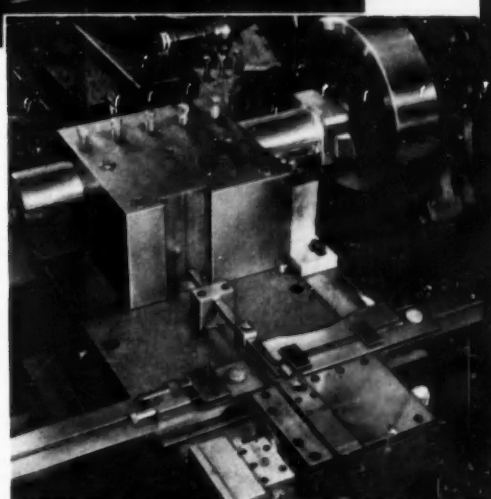
The Gisholt Hydraulic Tracer Unit operates at high pressure with slide movements controlled by a template and stylus-type follower. Square faces can be machined and cuts of ¼" depth at .035" feed are easily made. Setup is quick with convenient micrometer adjustment screws for accurate slide and template positioning.

The Hydraulic Tracer Unit is adaptable to other machines, too, for solving a wide variety of production problems. Your Gisholt representative can tell you about it and the No. 24 Hydraulic Automatic Lathe.

Quick changes for doing spherical, straight and tapered boring in a multitude of parts have one simple solution . . . the Gisholt Hydraulic Tracer Unit.



No. 24 Hydraulic Automatic Lathe set up for bearing race production.



The hydraulic tracer controlled rear slide arrangement. Note the micrometer settings for positioning the template.

GISHOLT

TIME-SAVING IDEAS

HERE'S SOME TICKLISH INTERNAL BORING AND FORMING—*Done With Standard Slide Tools*

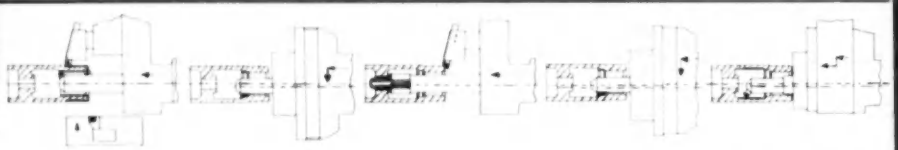
How the Gisholt Fastermatic Automatic Turret Lathe Reduces Time and Costs



The producers of these parts had the problem of going through an outer small diameter bore in order to get to a larger diameter bore inside. Ticklish as it sounds, they came up with "stock" tool answers to keep costs down.

The job's being done on a Gisholt 2F Fastermatic Automatic Turret Lathe with slide tools mounted on hexagon turret stations and operated by the standard back-facing attachment on the rear cross slide. After the tools have reached required depth through the small bore, the back-facing attachment actuates the slide which carries the tool the short distance necessary to complete internal machining operations. The workpieces—which are malleable iron valve castings—are machined in a floor-to-floor time of 4.2 minutes.

Here standard tools working in close quarters cut costs with internal boring and forming of castings completed in one fast, automatic cycle.



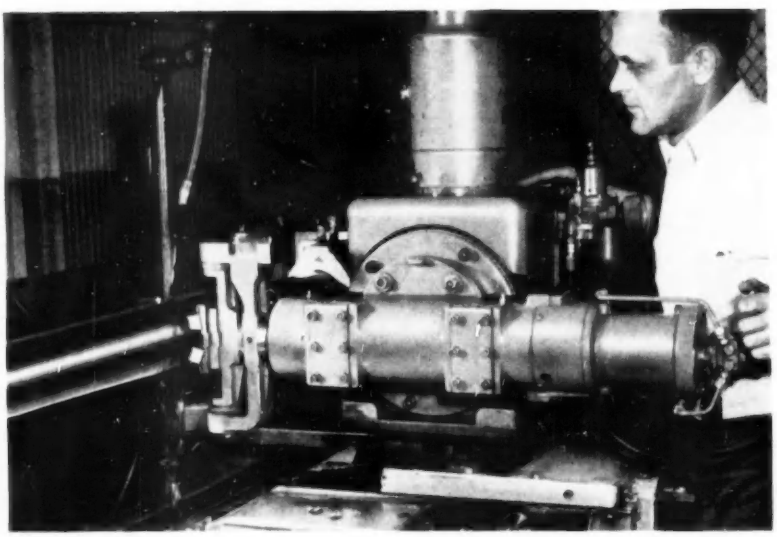
SAVES UP TO 3½ HOURS PER PART...INSURES BETTER CHROME PLATING BY SWITCH TO SUPERFINISH

Inexpensive Attachment for Turret Lathe

Long life and fine operation make it necessary that these forged steel piston rods for hydraulic presses be chrome plated. Production was slow and costly—penalized by a polishing operation which required four hours to complete.

A dramatic answer to this time problem was provided by Superfinishing. Now, the piston rods are turned on this Gisholt 3L Saddle Type Turret Lathe and Superfinished via an inexpensive attachment—right on the lathe. There is no polishing operation this way; only 30 minutes are needed to Superfinish. The saving in time: 3½ hours!

Not only is the geometry of the piston rod improved by Superfinishing, but the surface is also brought down to true base metal which permits excellent, hard chrome plating. In this case, the turned surface of approximately 150 micro-inches R.M.S. is refined to a 5 to 7 micro-inch surface finish.



Surface finish on the piston rod is improved by Superfinishing over the former polishing method.

This simple attachment on a Gisholt Turret Lathe reduced a four-hour polishing operation to a thirty-minute Superfinishing job. Costs are lower, results much better.

The new SUPERFINISHING CATALOG tells about this important process, shows many interesting jobs. Write for yours.

GISHOLT

GISHOLT

TIME-SAVING IDEAS

NOTHING LIKE THE CROSS-FEEDING HEXAGON TURRET FOR JOBS LIKE THIS

Heavy Parts Simultaneously Machined at Both Ends

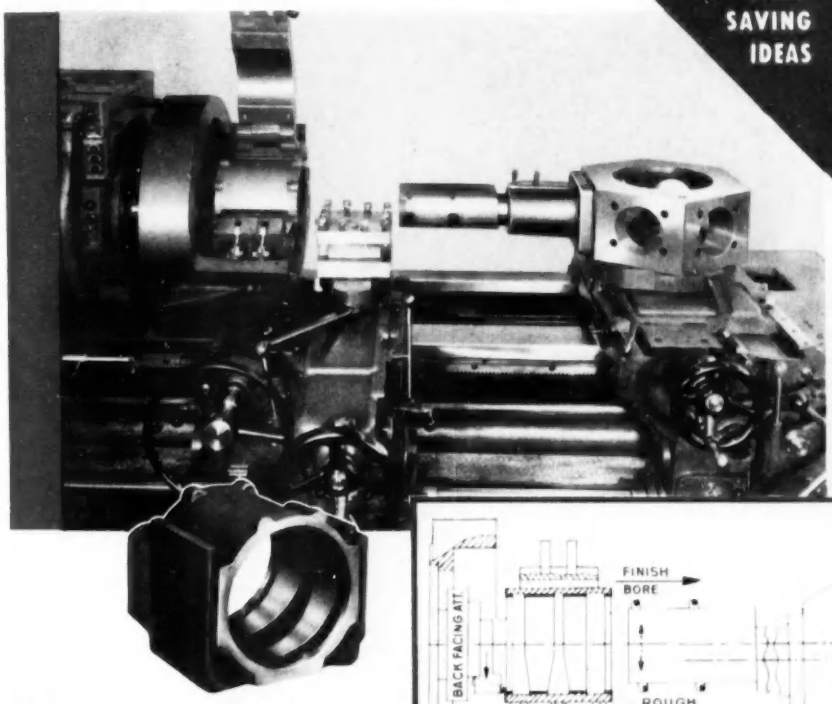
Not every lathe can make such a simple job of work like this: rough and finish boring . . . while simultaneously facing both ends of a part.

This Gisholt 4L Saddle Type Turret Lathe is doing it to these railroad bearing journal boxes. The cast steel workpieces are loaded by crane in the fixture.

The cross-feeding hexagon turret carriage is equipped with solid positive stops on the front and rear which take care of sizing the bore for both the forward feed and reverse feed machining operations. Two tools are on both the front and back of the boring head, thus splitting up the cut.

For rough boring, the hexagon turret is brought forward to the front stop and then fed into the work. When boring is completed, the hexagon turret is moved back to the rear dead stop and fed outward for finish boring. A back facing attachment within the spindle faces one end, and the square turret tool faces the other end.

This unique tooling setup is used for machining 9 different sizes of workpieces with f.t.f. time ranging from 23 to 31 minutes.

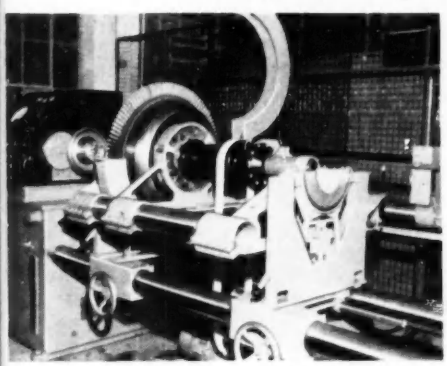


When fixture is closed and machine starts, cross-feeding hexagon turret tools you see do rough boring. Tools on other side do finish bore on reverse feed.

● ● ●

A SIMPLE SOLUTION TO SPECIAL BALANCING PROBLEM

Gisholt Balancing Machine Locates Dangerous Unbalance in Jet Engine Part



Jet engine turbine rotor assembly ready for precision balancing. Shroud is lowered over rotor during balancing operation.

Gisholt Balancing School—offers complete courses in theory and practical application of balancing to help with your particular problems. For complete details, starting dates, write today.

Unbalance causes vibration, and vibration means trouble. Bad trouble in the case of this jet engine turbine rotor assembly if it were allowed to remain. That's why precision balancing is such an important part of production.

A Gisholt DYNETRIC 3UJP Balancing Machine is used for dynamically balancing every assembly. Placed in a special cradle, the unit is rotated on its own bearings. Shrouding is provided to reduce air load.

Taking direct readings from the machine, the operator quickly corrects unbalance by adding steel weights in a balance-ring groove machined on the outside face of the turbine wheel for the left correction plane—and by adding washers to bolts for the right correction plane. The result is balance of unbelievably low tolerances, completely smooth operation.

Precision balancing can make your rotating parts and products better performing . . . and more lasting. Gisholt balancing equipment is adaptable for virtually every balancing problem.

Providing balancing correction facilities in the original design speeds up this vital balancing operation.

DYNETRIC BALANCERS GISHOLT

There is full information in the booklet, GISHOLT BALANCING MACHINES. Ask your Gisholt representative, or write direct for your copy.

GISHOLT

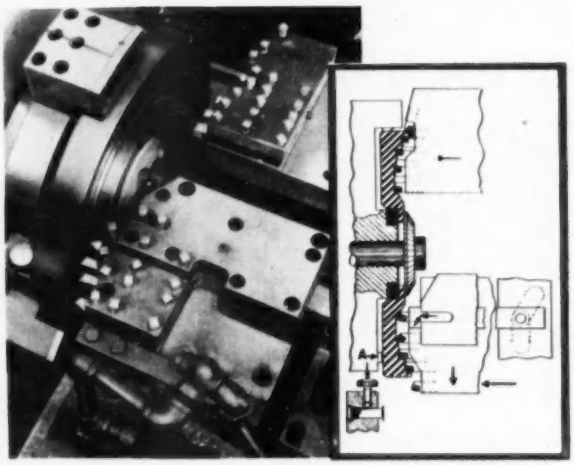
TIME-SAVING IDEAS

BUNCHING UP OF CUTS FINISHES LARGE PARTS FAST

Simplimatic Pulls 11 Tools at Once to Cut Costs!

These large steel flywheels require boring and facing on several diameters—plus special angle facing. The best approach to the problem was found in the Gisholt Simplimatic Automatic Lathe. This permitted combining all operations in one setup.

The 19" flywheel is held by an air-operated drawback fixture. The job starts with tools on the front slide being table fed to cutting position. Normal slide movement then carries the tools away from the spindle centerline, finish facing three step faces and the rim face. The hub angle is finish faced with a tool held in a sliding tool holder mounted inside the main tool block and controlled by a special cam. Tools on the rear slide finish bore three co-bores, finish turn the hub and chamfer the rim O.D. and I.D. A total of eleven tools works simultaneously to finish this part in just 5.60 minutes f.t.f.



Tooling setup for machining flywheels. "A" shows spring jack for supporting edges of workpiece and preventing chance of distortion.

Close-up shows tooling arrangement on front and rear slides and sliding tool holder mounted inside the main tool block.

Straight and angular facing, plunging and facing, turning, boring and chamfering . . . all these cuts are taken simultaneously on the Simplimatic Automatic Lathe with speed that means minimum costs.

• • •

CHUCKING RING SAVES SECOND OPERATION

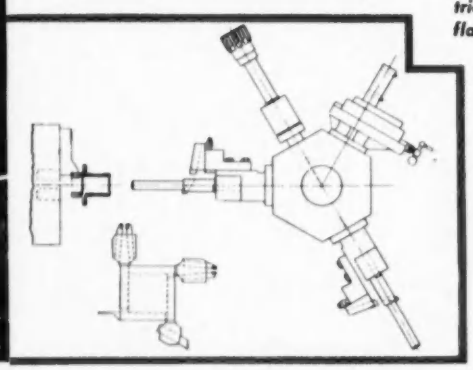
Gisholt Ram Type Turret Lathe Speeds Turning and Boring Work

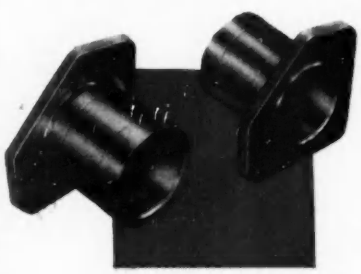
Machining these bearing support bushings would normally be a two-operation job. But it isn't, because of the addition of a chucking ring to the casting. It's a case of the slight value of the cut-off stock being more than made up by savings in time and greater accuracy.

Tools on the hexagon turret bore, turn, face, ream and chamfer. At the same time, tools mounted in special double tool holders on the square turret rough and finish straddle-face the flange, form the O.D. relief and cut off to length. Time is only 3.5 minutes f.t.f.

By leaving a chucking ring on the workpiece, a second operation is eliminated, concentricity is assured as is parallel facing of flange. Saves machining time, too.







No. 9-1054
629

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



GISHOLT MACHINE COMPANY Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Russian Automotive Industry

(*Continued from page* 106)

placing on and removal of the workpieces from the line, and often even including automatic inspection not only at the end of the process, but also during the process.

d. The establishment of automatic plants with maximum "automatization" not only of separate operations and processes of machining individual items, but also of materials handling equipment for the processing of the finished products of the plant. An automatic plant actually consists of a combination of all three mechanized handling systems described above, including automatic inspection and packing of finished products.

Mechanization and automatization methods have been used in the USSR for a long time, but the practice was until recently confined mostly to more or less simple branches of industry, such as food processing, cigarette manufacturing, etc. In machine building and particularly in the automotive industry mechanization was actually developed in the eve of the 30's and during and after World War II. The Fourth Five-Year Plan particularly stressed the mechanization and automatization of the production processes in those lines which have been largely employing labor-intensive methods, including the construction industries and some stages of coal mining. The Soviet government continues to emphasize the need for widespread mechanization methods in the machine building industry, where assembly line techniques were first introduced. During World War II these methods were applied on a wide scale in the armament industry. At the present time, there are operating in Soviet machine building plants 39 automatic lines, and one plant-automat for automatic mass production of pistons for automotive engines.

Present trends in mechanization and automatization of Soviet industry may be summarized by quoting from the writings of the Vice Minister of the Machine Building Industry:

. . . Recently in automobile and tractor plants many automatic lines, a large number of automatic, semi-automatic and "aggregate" machines were put in operation. . . . In many

USN Grumman COUGARS ARE

Alodized

WITH "ALODINE"®

for EXTRA PROTECTION





Navy LCdr Francis X. Brady with Cougar, in which he broke transcontinental flight record April 1st, 1954—3 hours, 46 minutes, 49 seconds

The terrific speed of the GRUMMAN Cougar and its severe service requirements make surface protection of its aluminum components a "must." "Alodine" provides a durable paint bond, in addition, it protects the aluminum against corrosion, especially when exposed to sea air.

Alodizing meets the requirements of Military Specification MIL-C-5541.

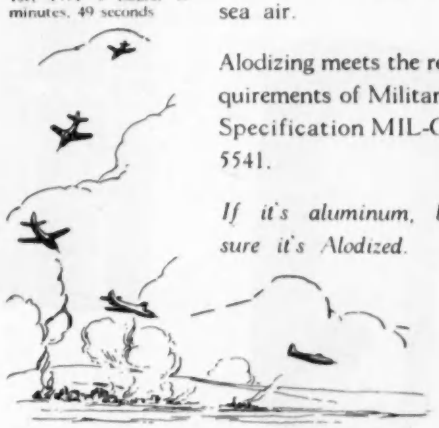
If it's aluminum, be sure it's Alodized.



Snow-covered Panther Jets on flight deck of USS Philippine Sea prior to take-off



Panther Jets on run-ways



Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

DETROIT, MICH. NILES, CALIF. WINDSOR, ONT.

shops semi-automatic machines were installed for polishing operations and welding operations; automatic apparatus for regulating the temperature of furnaces in heat treating of machine parts and for regulating other modern equipment. Most of these innovations were developed within the automobile and tractor. . . . The number of mechanized equipment lines is expected to increase by almost three times by the end of the Fifth Five-Year Plan (1955). . . . The production by automatic processes of automotive pistons is being expanded; "shops-automats" are being built for the production of piston rings and piston pins. . . .

. . . There remain [however] many plants with extensive production reserves which have not yet been mechanized. Controlling operations have not yet been developed along automatic lines. Consequently, the number of workers employed in the "technical control" [inspection] departments constitutes 19 per cent of the total number of production workers in the automotive industry. Also considerable manual labor is still being employed in foundry shops. . . .

. . . Automobile and tractor plants are experiencing a great need for the application of equipment for heating and heat treating of parts with high frequency current. . . . In the textile enterprises we must organize the production of inexpensive, durable and attractive (without using wool) for upholstering passenger automobiles.



JOHNSON
Tappets
"fill the exacting requirements of today's engines"

Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.



"Tappets are our business"
JOHNSON Jp PRODUCTS INC.
MUSKEGON, MICHIGAN

Special Device for Ball Joint Suspensions

(*Continued from page* 55)

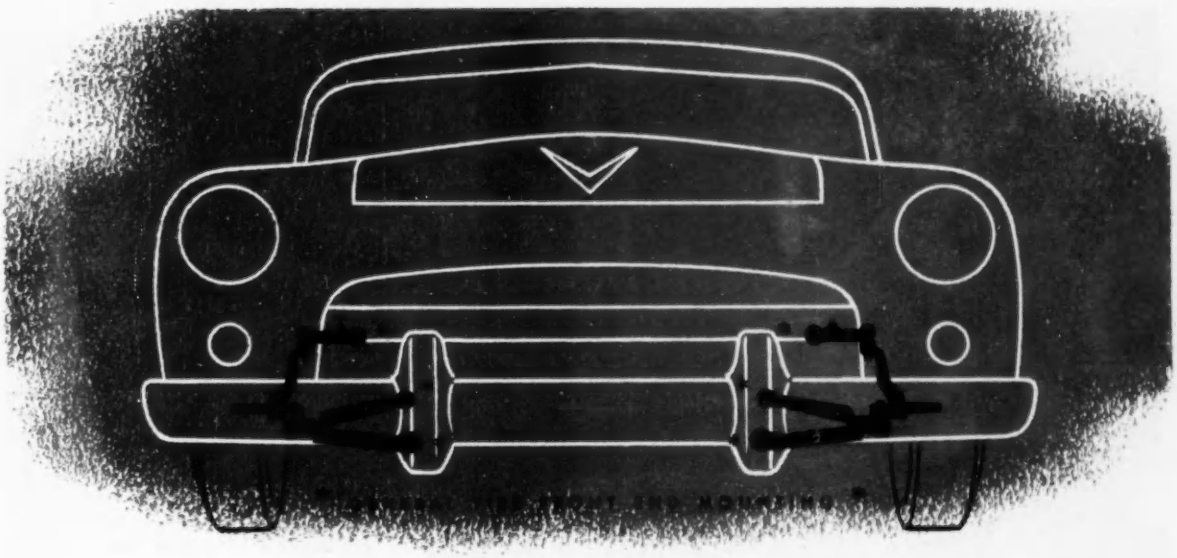
load is applied by the hydraulic arms.

An air operated torque control wrench is then utilized to tighten the lower control arm into position. When this job is performed, another worker places the remaining two arms of the Octopus over the wheel spindles. The head of each arm floats in two planes to properly locate the spindle for correct caster and camber. Bolts are inserted in the upper control arm when it is in position. A dial type gage is then used to measure the number of shims required on each bolt for the proper caster and camber. This dial gage reads directly in Ford shim sizes—such as four large, one small—rather than in fractions or decimals. As the frame continues on the line to another station the shims are added and the upper control arm is tightened in place. The shims are not added at the time of alignment because the frame is upside down.

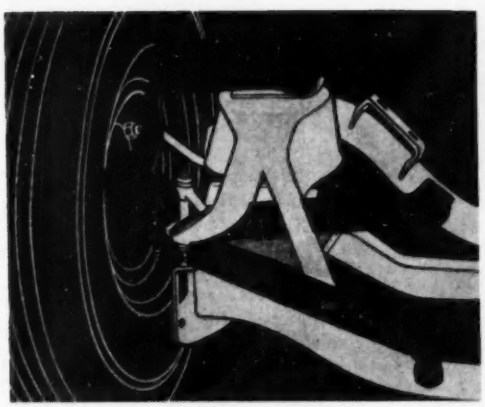
Ford considers the Octopus so vital for the safety of its cars that each alignment unit is used but half a working day. It is then checked against a master gage and held in readiness. Each unit is self-contained with its own power plant and hoist motor.

BOOKS . . .

AIRCRAFT YEAR BOOK—1953, *published by Aircraft Industries Association, copies available from Lincoln Press, Inc., 511 11th St., N.W., Washington 4, D. C. Price, $6.00.* Presented here is a complete review of the events and developments in military and civil aviation in the nation. The book serves as a complete directory of aircraft executives, statistics, chronology, and agencies in U. S. aviation. It is also a photographic record of notable aerial events during the fiftieth year of powered flight. Altogether, it contains over 100,000 words of aviation facts.



Here's* Why Millions Are Driving without the Shakes!



Typical front end suspension showing applications of General's Silentbloc mountings.

Front end Silentbloc mountings developed by General's engineers for leading automotive manufacturers give autos a two-way stretch . . . allow them to float over chuck-holes and insulate passengers from bumps.

This is just another example of the hundreds of successful automotive products that have grown out of General's custom design and production service. We work in extruded rubber and plastic, molded rubber and fiberglas, rubber-to-metal parts, metal stampings, vibration and shock units, and panel mounts. We'll design and produce to your specification.

Why not check into our successful record in the automotive and aviation fields? Just fill out the coupon below for complete information.

"From Plans to Products in Plastics and Rubber"

THE GENERAL TIRE

Industrial Products Division
WABASH, INDIANA

Industrial Products Division
The General Tire & Rubber Co.
Wabash, Indiana

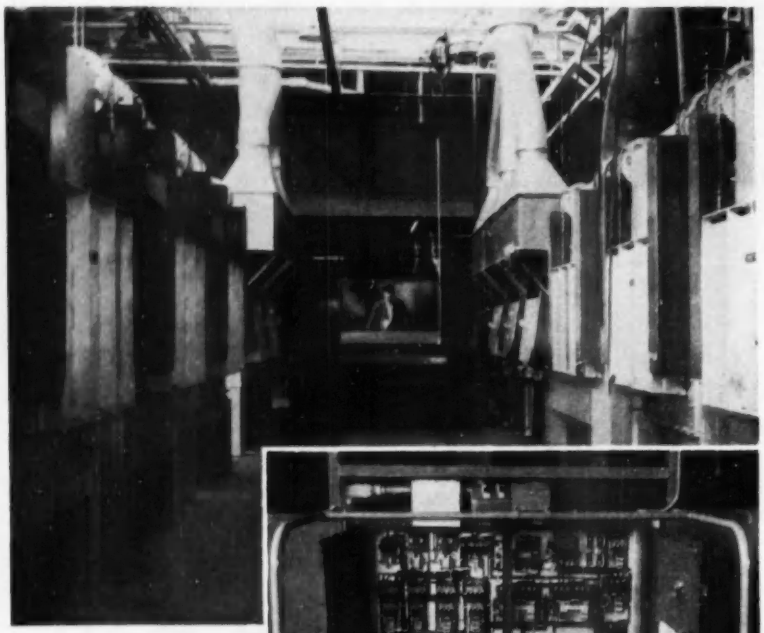
☐ Send descriptive literature on your products and services.

☐ Have your representative contact us.

Name_____ Company_____

City_____ Street_____ State_____

AI-9-54



PLANET ROBOT PULL-OUT CAR

ROBOT CAR CONTROL PANEL ▶

to load and unload furnaces... automatically...

Just Press A Button

This PLANET robot car, specially designed for heat treating operations at a large automobile plant, is completely automatic and entirely self-propelled. It loads and unloads trays of forgings weighing up to 600 lbs. from furnaces at *either side*, permitting a compact, space-saving installation.

Here's automation in action . . .

Trays are withdrawn from a right hand furnace and discharged into furnaces on the left. The entire cycle is handled by pushing one button.

If you have a materials handling problem, it will pay you to "Plan with Planet". Experienced Planet engineers design and install specially engineered systems complete from the preliminary survey and specifications to installation and testing.

Write today . . . for information on applying automation to your operations.

PLANET CORPORATION
1822 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

Power Train of Tractor Shovel

(*Continued from page* 54)

With the shift from low or working speed range to high or traveling speed range, the sequence is as follows:

Forward in third
2-6-5-7-10
Reverse in third
1-3-4-6-5-7-10
Forward in fourth
2-6-9-7-10
Reverse in fourth
1-3-4-6-9-7-10

Insofar as the tractor shovel operator is concerned, there are four controls, two of which he uses only intermittently. The latter two are the mechanical speed range shift and the manual de-clutch for the rear axle on the four-wheel-drive model, both of which are on the floor of the machine.

The controls used most frequently are the forward-reverse and high-low selector levers on the steering column.

To permit the engine to be mounted over the rear axle, the output shaft is mounted at a considerable distance below the input shaft.

Flanged universal joints are used in the drive line between the torque converter and transmission, and from the transmission to the axles.

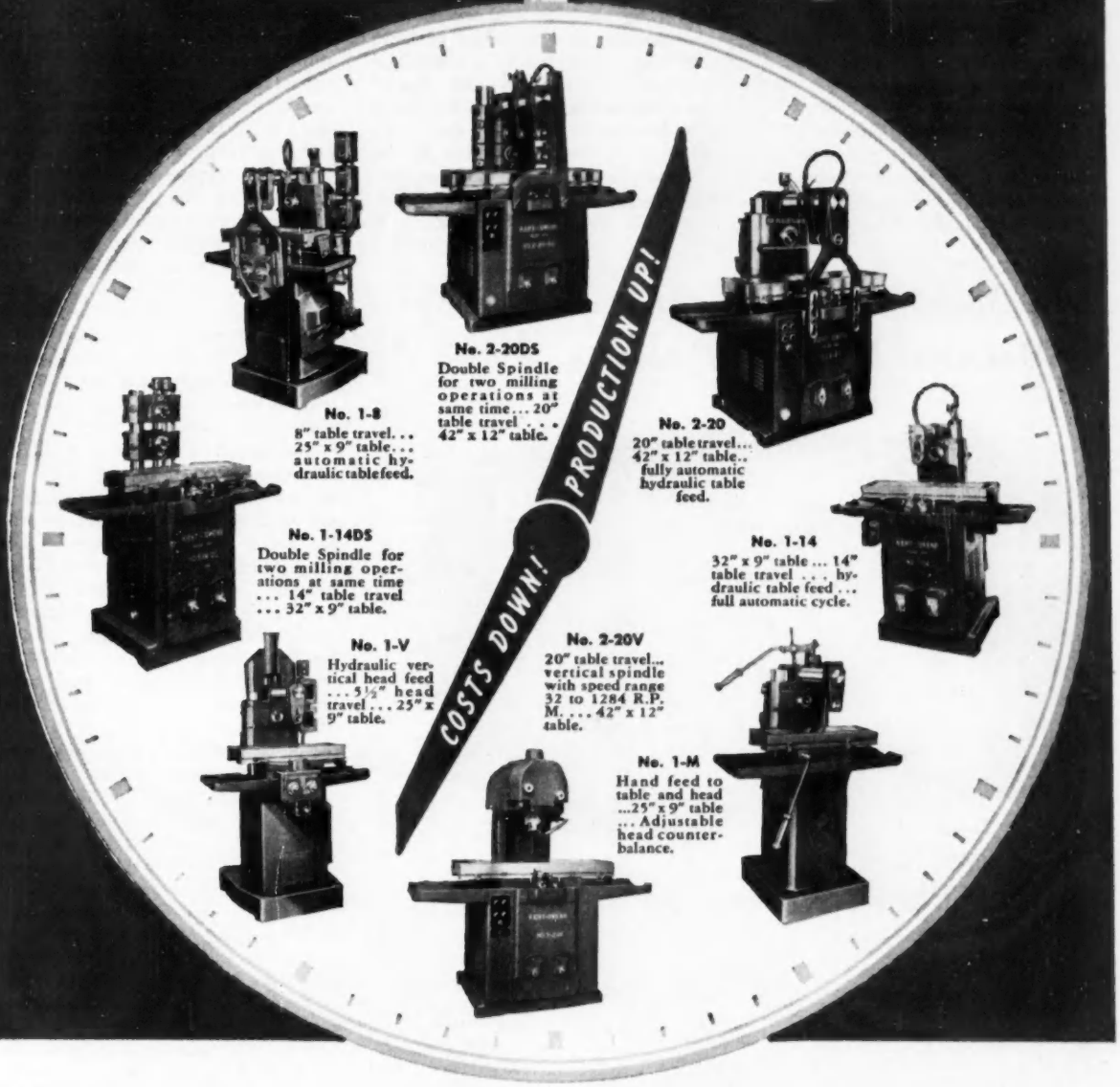
Power is transmitted to the drive shaft through a pinion to a ring gear and differential in the center section or carrier of the axle housing. The differential housing is mounted on two bearings inside the center section. The drive shaft is actuated directly from the side gear of the differential.

A secondary reduction is provided at each drive wheel by means of planetary gearing. The sun gear of the planetary set, which is splined to the drive shaft, actuates three planet gears within a stationary ring gear. Details of the planetary gear assembly are shown in Fig. 3. Depending upon the specific tractor shovel model, torque reduction at the wheel is either 3.27-1 on the model 75 or 3.5-1 on the larger units.

Drive axles are of special Clark design for tractor shovel application. Bendix U-joint steering axles are used.

Depending upon requirements of the specific model, axle housings are either cast steel with heavy sections, or one piece heat treated and hot formed tubular type.

Time to Reduce Milling Costs!



KENT-OWENS REPRESENTATIVES

BOSTON
General Machinery Corp.

BUFFALO
Don W. Patterson

CHICAGO
Four States Mach'y Company

DALLAS
Hosner Machine Tool Co.

DAYTON
C. H. Geniger Mach'y Co.

DETROIT
A. C. Haberkorn Mach'y Co.

FT. WAYNE
Ossio Machinery Co.

GRAND RAPIDS
Joseph Monahan

HAMILTON, ONT.
F. F. Barber Mach'y Company

HARTFORD
Harrington Machinery, Inc.

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Ossio Machinery Co.

KANSAS CITY
Eichman Machinery Co.

LOS ANGELES
Gutmann Mach'y Co.

MILWAUKEE
Four States Mach'y Company

MINNEAPOLIS
The Satterlee Company

MOLINE
John J. Normoyle Co.

MONTREAL
F. F. Barber Mach'y Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Harrington-Wilson-Brown Company

PHILADELPHIA
Colco Machinery Company

PITTSBURGH
Bussey Machinery Company

ROCHESTER
F. W. Schiefer Machinery Co.

SAN FRANCISCO
C. F. Bulcost Machinery Co.

ST. LOUIS
Blackmon & Noetzel Mach'y Co
Clarke Equipment Company

SYRACUSE
F. F. Owens Mach'y Company

TORONTO, ONT.
F. F. Barber Mach'y Company

WINDSOR, ONT.
F. F. Barber Mach'y Company

Kent-Owens machines assure you of speed with accuracy... and cut your milling costs! Designed with advanced features . . . performance-proved for meeting tough schedules in production milling. Rugged . . . simple . . . versatile. Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

Call on

KENT-OWENS

for Milling Machines

Increasing Use of Diesels in European Cars

(*Continued from page* 68)

3400 rpm. Maximum speed claim is 62 mph, with a five-passenger four-door sedan weighing 2600 lb empty.

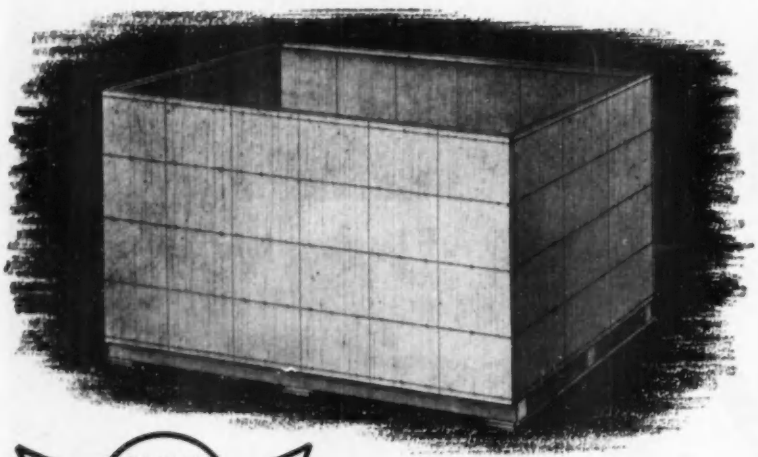
No British maker at present offers a Diesel-powered passenger car as an alternative to the gasoline model, the reason doubtless being the uniform rate of taxation for the two types of fuel. The Standard Co., of Coventry, however, has developed a four-cyl Diesel of 127.5 cu in. displacement, which is now in use on a large number of London taxicabs after approval by the city authorities, who are exacting in the matter of noise and odor. This engine is a development of one which has been used in the Ferguson tractor since 1951, and now develops 40 hp at 3000 rpm. Outstanding in the construction of the Standard is the use of the Freeman-Sanders type of combustion chamber. With this the fuel is injected by a pintel-type C.A.V. atomizer into a spherical combustion chamber in the cylinder head, which in turn opens directly above a crescent-shaped air cell machined in the cylinder block. The combination of these two chambers gives fuel economy over the full working range and practically eliminates the characteristic "Diesel knock." A patented arrangement at the top of the slip-fit centrifugally-cast dry cylinder liners controls the build-up of carbon on the piston land above the top ring. It consists of two cuff rings, the lower of which has an internal diameter slightly smaller than that of the cylinder bore, and is made of hard heat-treated chromium iron. In service this ring scrapes off deposits of carbon on the top piston land, thus preventing cylinder bore scoring. The upper ring has a cut-out portion which forms part of the crescent-shaped aircell.

The weight of the Diesel engine is 539 lb, compared with 442 lb for the Vanguard gasoline engine with similar equipment. This, together with the extra weight of batteries and other special equipment results in an increase in weight of about 220 lb over the gasoline car. The Vanguard chassis in which this engine is fitted has a wheelbase of 94 in., tread 51 in. front and 54 in. rear, three-speed transmission and 5.375 to 1 final drive ratio.

The largest Diesel engine manufacturer in England, the Perkins Co., has a three-cyl model of 3.5 in. by 5 in. bore and stroke, giving 144.3 cu in. displacement, developing 34 hp at 2200 rpm. While suitable for passenger car service its use appears to be limited at present to light commercial vehicles. General design is the same as that of the four- and the six-cyl models and it features vertical valves in head, and a spherical combustion chamber formed half in the head and half by a detachable steel cap. The atomizers have two sprays, one being into the patented combustion chamber and the other into the cylinder itself.

Recently put into production in England by the Turner Manufacturing Co. is a two-stroke Diesel designed by Hans List, of Graz, Austria. The two-cyl version, with 3.62 in. by 4.13 in. bore and stroke, giving 85.19 cu in. displacement, develops 35 hp at 2800 rpm. It is a loop-scavenged type with a Roots blower. This is being offered for passenger car service, but in view of the slight difference between English gasoline and Diesel oil costs its future appears to be with light commercial vehicles.

A Multi-Purpose Box That Answers Materials Handling Problems...



SHIPPING SUPERSTRONG CONTAINERS — REG. U.S. PAT. OFF.

WIREBOUND PALLET BOX



The versatility of wirebound containers is well exemplified in the SUPERSTRONG Wirebound Pallet Box. You can use it on the production line...for interplant transportation of parts...as a storage bin...as a shipping container which may be easily knocked down and returned for reuse.



SUPERSTRONG Wirebound Pallet Boxes are light in weight, sturdily constructed—and offer an economical answer to materials handling cost problems. They are engineer designed and built to your individual requirements. We would appreciate an opportunity to study your problems and offer our suggestions.





RATHBORNE, HAIR and RIDGWAY BOX CO.
1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

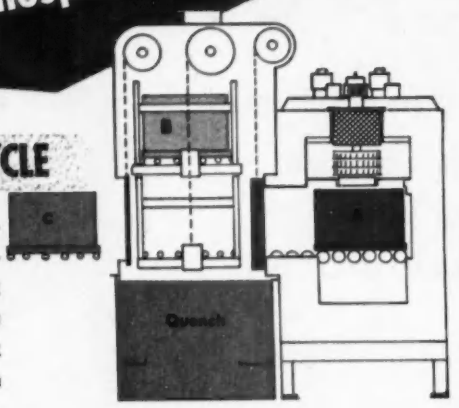

NOW
The Leader in Stainless
Socket Cap Screws
OFFERS YOU
THE LEADER POINT
Allen's unthreaded Leader Point permits easier starting, reduces the possibility of cross threading, protects threads from damage if the screw is accidentally knocked or dropped. Your Allen Distributor stocks the largest range of sizes in 18-8 stainless cap screws available anywhere ... 97 standard sizes #4 x ¼" to ⅝" x 3" with NC threads; #10 x ⅜" to ⅝" x 1½" with NF. Be sure to specify genuine Allen Leader Points.
ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.
STAINLESS SET SCREWS
With the improved Allenpoint, available from your distributor in 54 standard sizes #4 x ⅛" to ½" x 1" NC and #10 in lengths from 3/16" to ¾" NF.
Sold only through leading Industrial Distributors.

Sealed Cycle.....

A Dow Furnace FIRST for Batch-type controlled atmosphere furnaces.

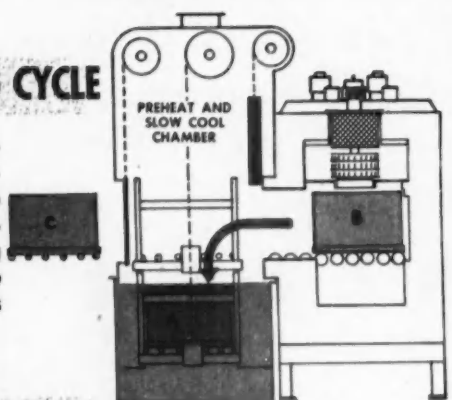
Step 1–LOADING CYCLE

Box A containing full furnace load of parts processing in work chamber. Box B—fully loaded, pre-heats in the upper vestibule. Box C—fully-loaded, waits on conveyor.



Step 2–QUENCHING CYCLE

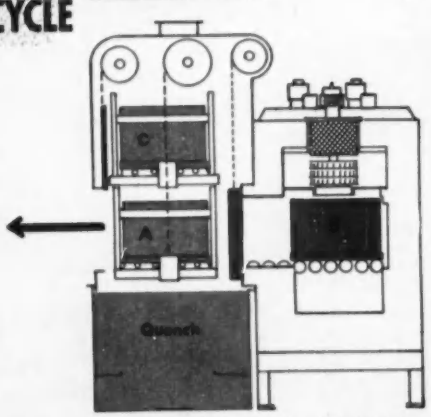
Box A completely processed, moves out to elevator and is lowered into quench; bringing preheated Box B to loading level. Box B is pushed into heat chamber and door is closed.



Step 3–RELOADING CYCLE

After proper interval, outer door is opened. Box C is placed on upper elevator and raised to pre-heat position as Box A is lifted from quench and removed from lower elevator.

Sealed Cycles' double door seal affords complete flexibility of processing without exposing heat chamber to air contamination.



Upper vestibule is easily adapted for slow cooling. Quench is adaptible for interrupted quenching.

DOW FURNACE COMPANY

12045 Woodbine Ave., Detroit 28, Mich.
Phone: KEnwood 2-9100

First WITH MECHANIZED, BATCH-TYPE, CONTROLLED ATMOSPHERE FURNACES

CALENDAR

OF COMING SHOWS AND MEETINGS

First International Instrument Congress and Exposition, Philadelphia, Pa. .....Sept. 13-24
(Exhibit open Sept. 15-21.)

Fourth European Machine Tool Exhibition, Milan, Italy .....Sept. 14-23

Society for Experimental Stress Analysis, annual meeting and exhibition, Philadelphia, Pa. Sept. 21-23

Commercial Motor Show, Earls Court, London, England Sept. 24-Oct. 2

ASME Annual Engineering Conference, Statler Hotel, Los Angeles, Calif. .....Sept. 27-30

National Industrial Packaging and Materials Handling Exposition, Chicago, Ill. .....Sept. 28-30

Association of Iron and Steel Engineers, annual convention and exposition, Cleveland, Ohio Sept. 28-Oct. 1

Standards Engineering Society, annual meeting, Haddon Hall Hotel, Atlantic City, N. J. .....Oct. 1-2

SAE National Aeronautic Meeting, Statler Hotel, Los Angeles. Oct. 5-9

Paris Automobile Show, France. Oct. 7-17

AIEE Fall General Meeting, Morrison Hotel, Chicago Ill. .....Oct. 11-15

National Conference on Industrial Hydraulics, Sheraton Hotel, Chicago, Ill. .....Oct. 14-15

ASME-ASLE, first annual lubrication conference, Lord Baltimore Hotel, Baltimore, Md. Oct. 18-19

SAE National Transportation Meeting, Sheraton-Plaza Hotel, Boston, Mass. .....Oct. 18-20

International Motor Show, Earls Court, London, England ...Oct. 20-30

American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. .....Oct. 24-27

National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco. Oct. 25-27

AIEE Machine Tool Conference, Statler Hotel, Detroit, Mich. Oct. 25-27

SAE National Diesel Engine Meeting, Statler Hotel, Cleveland, Ohio .....Oct. 26-28

American Society of Body Engineers, annual technical convention, Rackham Memorial Bldg., Detroit, Mich. .....Oct. 27-29

National Metal Congress and Exposition, International Amphitheatre, Chicago, Ill. .....Nov. 1-5

SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. .....Nov. 4-5

Industrial Tool & Equipment Show, Montreal, Canada .....Nov. 8-12

Magnesium Association, tenth annual meeting, Hotel Chase, St. Louis, Mo. .....Nov. 15-17

Pan-American Road Race, Mexico Nov. 19-23

ASME, annual meeting, Statler Hotel, New York, N. Y..Nov. 29-Dec. 3



LOOK

it handles like a one-piece ring!

NEW MUSKEGON

"UNITIZED"

CHROME PLATED OIL RINGS

MUSKEGON Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

Since 1921... The engine builders' source!

You see at a glance that it's something new, different, better—a multiple-piece oil ring that *handles* like a one-piece ring!

But take a *good* look. See for yourself how Muskegon's patented *Unitizing* process holds the pieces together in the right order for quick, easy installation. Then, in the first rush of hot oil, as the engine starts to run, the special adhesive dissolves completely and leaves the parts of the ring free to function independently of each other.

Test Muskegon's CSR-200 rings in your own engines, in your own laboratory. See how the chrome plated rails reduce ring wear and bore wear, scuffing and friction—see how these rings keep the engine new longer and increase oil economy.

And your eyes will be wide with amazement when you learn that the price is just *half* that of chrome plated cast iron oil rings! Write us today.

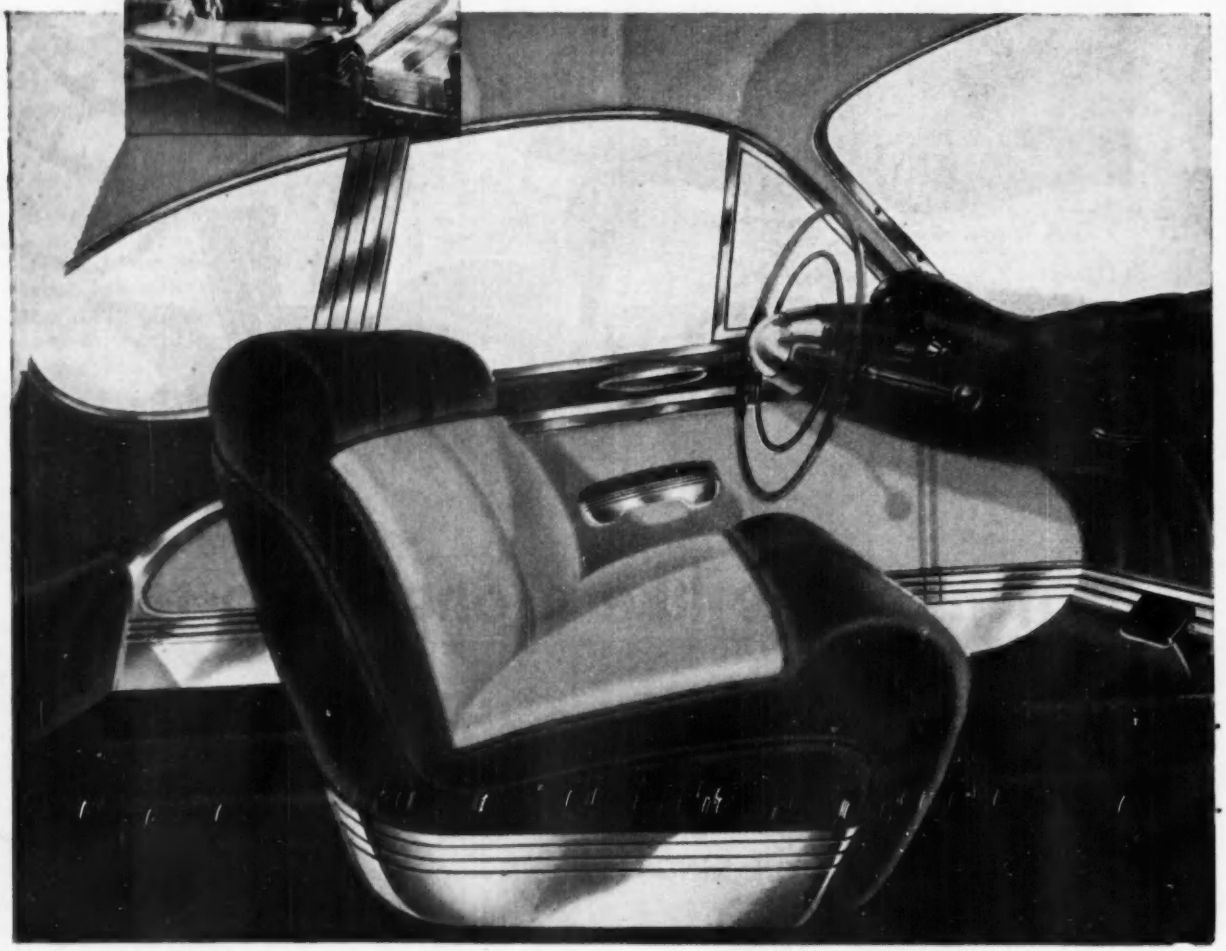
DETROIT OFFICE: 521 New Center Bldg., Telephone Trinity 2-2113

Plan on ALUMINUM

and Plan on



Over 30 Reynolds plants in 18 states assure a steady flow of parts to the automotive industry. Two of these plants alone have over 200 major pieces of production equipment including 128 presses—mechanical from 2 to 1700 tons and hydraulic from 300 to 5000 tons. Photo shows 1700 ton Reynolds Press and one of the largest drawn aluminum parts ever made—a one-piece 12′ by 4′8″ hull for an aluminum boat. *Write for your copy of Reynolds 24-page "Catalog of Facilities."*



REYNOLDS ALUMINUM

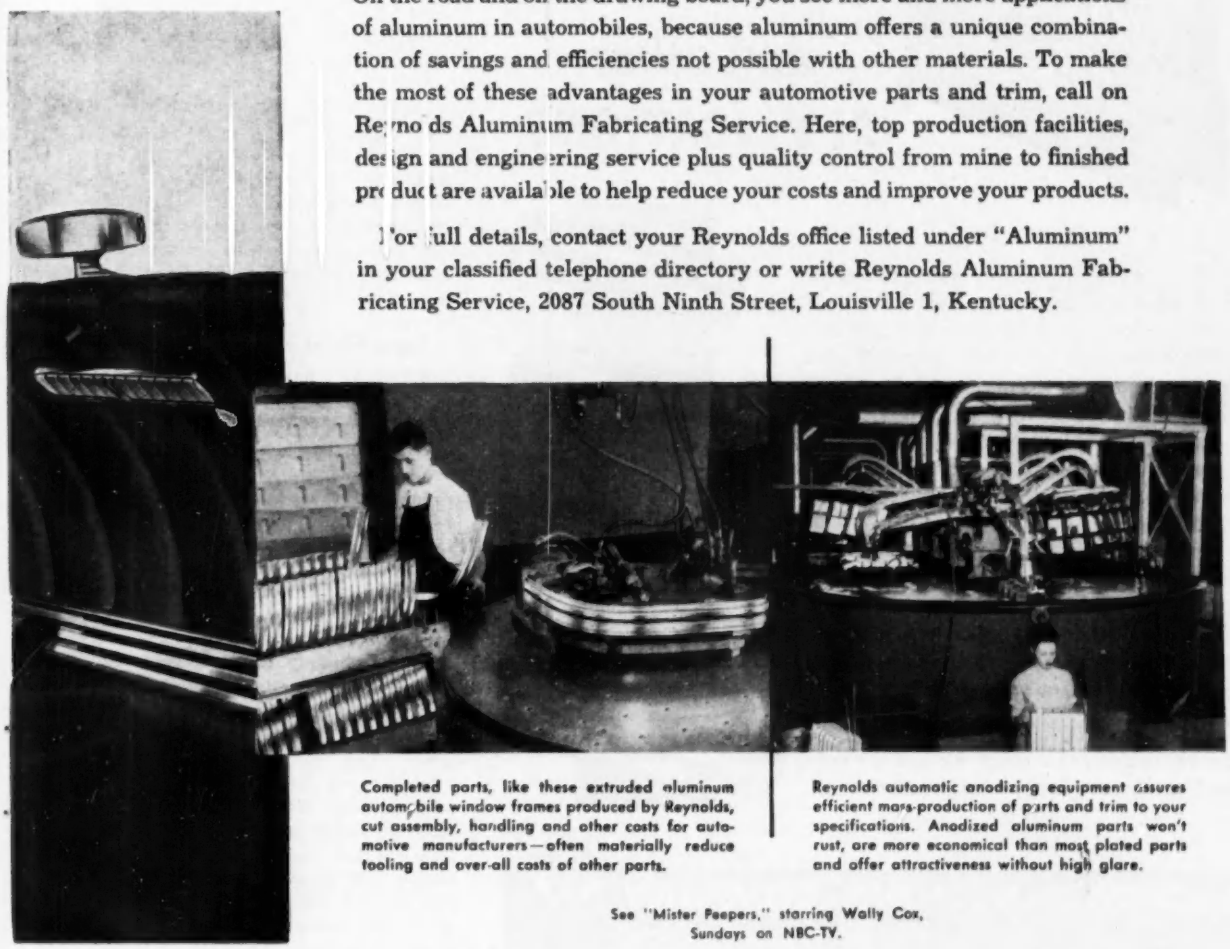
BLANKING • EMBOSSING • STAMPING • DRAWING • RIVETING •

REYNOLDS for

Automotive Parts and Trim

On the road and on the drawing board, you see more and more applications of aluminum in automobiles, because aluminum offers a unique combination of savings and efficiencies not possible with other materials. To make the most of these advantages in your automotive parts and trim, call on Reynolds Aluminum Fabricating Service. Here, top production facilities, design and engineering service plus quality control from mine to finished product are available to help reduce your costs and improve your products.

For full details, contact your Reynolds office listed under "Aluminum" in your classified telephone directory or write Reynolds Aluminum Fabricating Service, 2087 South Ninth Street, Louisville 1, Kentucky.



Completed parts, like these extruded aluminum automobile window frames produced by Reynolds, cut assembly, handling and other costs for automotive manufacturers—often materially reduce tooling and over-all costs of other parts.

Reynolds automatic anodizing equipment assures efficient mass-production of parts and trim to your specifications. Anodized aluminum parts won't rust, are more economical than most plated parts and offer attractiveness without high glare.

See "Mister Peepers," starring Wally Cox, Sundays on NBC-TV.

FABRICATING SERVICE

ROLL SHAPING • TUBE BENDING • WELDING • BRAZING • FINISHING

Small Engine Standardization For The Armed Forces

(*Continued from page* 51)

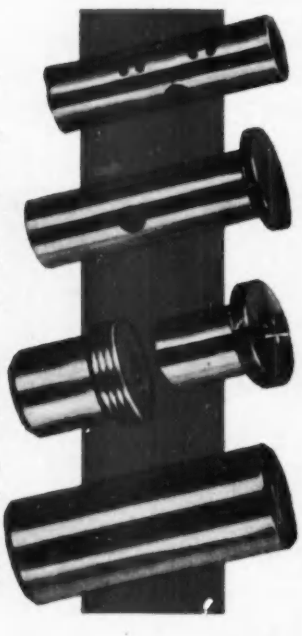
performance and general-purpose use characteristics.

The current status of this development program in terms of the four basic development phases discussed above, i.e., research and design, and experimental, prototype, and preproduction models, is given in Chart 3. The chart shows the initiation of the parallel two-stroke and four-stroke investigation on the 1½-hp size engine in February, 1952, and shows further that about September, 1953, the decision was made to adopt the four-stroke design for the three smaller sizes of engines in the family. With that decision made, development of the ½- and 3-hp sizes started immediately, and at the present time is progressing as shown, while the first lot of preproduction models of the 1½-hp size were completed in June, 1954. The chart also shows that in April of 1953 work was started on both the two-stroke and four-stroke approaches in the 10-hp size, with the decision as to which cycle will be adopted for this size not scheduled to be made until about mid-1955. Once this selection is made, development will continue into the preproduction model phase for the 10-hp size, as shown by the solid bar, and development will be started on the 6-, 15-, and 20-hp sizes based on the same type of design (two- or four-stroke) selected for the 10-hp size. The 1½-hp size engine has progressed to the point where it is expected that development will be complete and the unit will be ready for limited quantity procurement in 1955, with the ¼- and 3-hp sizes following about one year later. Therefore, in order that the transition from development to quantity procurement can be accomplished smoothly, production planning has been initiated.

Features of the New Engines

Although it has been estimated that on the basis of equal production volume the cost of the new military engines will be approximately twice their commercial counterparts, it is considered that this increased first cost will more than be made up through savings realized from standardization and increased performance. This development effort will result in a family of engines whose members are intimately related by virtue of the use of many identical parts between sizes. For example, over 90 component parts which will be identical in the 1½-hp and 3-hp size engines. This does not include many miscellaneous hardware items such as nuts, bolts, cotter pins, lock washers, etc., which will be common to all sizes. Again, on the basis of approximately 300 parts in any one engine, these seven engines would result in only 2100 parts if they were completely unrelated. However, it is expected that the use of the same parts in many sizes will reduce the total number of parts involved to 600 or 800, which is in considerable contrast to the estimated 23,000 different parts used in the 78 different makes and models of commercial engines procured in the last war to fill re-

Precision Parts... for AUTOMOTIVE and other APPLICATIONS



We have long been known as one of America's leading producers of drill jig bushings.

Many of our customers have asked us to direct our experience and "know how" gained in manufacturing precision tools, to make for them a variety of precision parts.

As a result, we have over the years, produced a great diversity of parts to exacting standards of tolerance, finish and required hardness, secured by correct heat treatment.

These parts include Diesel engine cam rollers, punch holder sleeves, externally ground threaded parts, Servo cylinders for helicopter mechanisms and a long list of other precision items.

We have the facilities and the "know how" to serve *you* on precision production parts requirements.

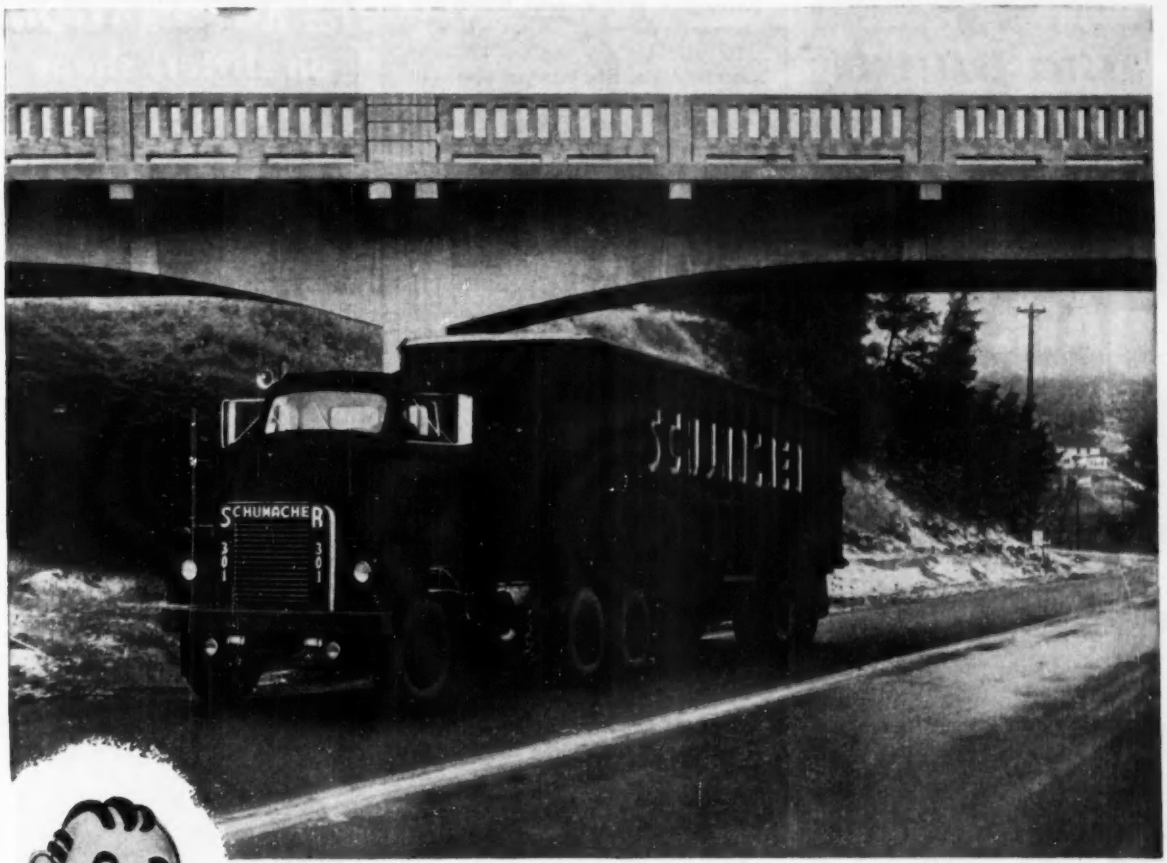
Your inquiries will be welcomed and will receive prompt attention!

ACCURATE BUSHING COMPANY

MAIN OFFICE AND FACTORY:
433 North Avenue, Garwood New Jersey • WEstfield 2-6400

ENGINEERING OFFICE AND REGIONAL WAREHOUSE:
5722 W. Chicago Ave., Chicago 51, Illinois • ESterbrook 8-7180

REPRESENTATIVES IN ALL IMPORTANT INDUSTRIAL CENTERS
WRITE FOR LITERATURE AND NAME OF YOUR LOCAL DISTRIBUTOR





Schumacher Motor Express, Inc. of Eau Claire, Wisconsin, put their fleet of International "Midwesterners" on the haul between Chicago and the Twin Cities—single-stick shifting all the way through Fuller R-950-C ROADRANGER® Transmissions.

Leading Truck Manufacturers Standardize on Fuller Transmissions

. . . for Fuller Transmissions have *proven* themselves in all types of on-and-off highway service, where load-and-road conditions are the toughest. Outstanding performance and *customer satisfaction* has created such a demand that leading truck manufacturers have *standardized* on Fuller Transmissions.

Famous "extras" that mean longer wear life, quiet operation, easy shifting are: . . . crowned gear teeth that reduce load concentration . . . offset mating gears to limit load concentration.

More than 110 different models are available, for trucks from 100 to 400 hp, engines from 330 to 1440 cubic inches . . . there is a Fuller Transmission *designed* with your job in mind . . . ready to help you move more, *for less.* Check with your local truck dealer for the *right Fuller* Transmission for your job.

where horsepower *really* goes to work



Fuller TRANSMISSIONS ®

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wisc. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Western Dist. Branch (Sales & Service, All Products), 641 E. 10th St., Oakland 6, Cal.

made by
MASTER CRAFTSMEN
to insure
Matchless Performance

Under the Hood
or
Under the Chassis
Specify
AIRTEX
PRODUCTS



WATER PUMPS
Lifetime-lubricated bearings. Patented long-life seals. Vacuum-tested.



FUEL PUMPS
Single and dual types with genuine Nuprene diaphragm, patented valve cage assembly, long-wearing rocker-arm and linkage.



TIE ROD ENDS
Four ways better! Rolled Threads, Phosphor Bronze Seat, Patented Ball Bearing Construction, Neoprene Washer and Dust Shield.

OTHER AIRTEX QUALITY PRODUCTS
Front End Suspension Parts • King Bolt Sets • Front Wheel Bearings
Hydraulic Brake Parts • Hydraulic Brake Hose • Stop Lite Switches
Fuel Pumps Parts and Distributors

AIRTEX PRODUCTS INC.
FAIRFIELD, ILLINOIS

quirements in the same horsepower size range.

In brief, the new engines will have a performance life between overhauls in excess of 1500 hours in contrast to the 500-hour goal in present specifications, will be easy to service and maintain, will be lightweight and small size, and will be inherently designed for satisfactory operation under environmental extremes.

The following list describes 21 specific design features which contribute to the overall high performance and quality of the 1½-hp military engine:

1. Overhead Valves with Rotators —To obtain relief from the detrimental effects of lead deposits, which accumulate when operating on highly-leaded military gasolines, overhead valves with valve rotators were incorporated into the engine design. This construction results in a low surface-area-to-volume ratio in the combustion chamber which minimizes the detrimental effects of the lead deposits and, therefore, permits longer operating intervals between combustion chamber clean-outs. The use of valve rotators increases the life of the valves by providing a "wiping" action between the valve face and valve seat, which prevents deposits from forming a "hot spot" which, in turn, would eventually lead to burned and/or warped valves.

2. Identical Intake and Exhaust Valves—This is an interchangeability feature dictated by the advantages to be gained from the maintenance and spare parts supply standpoint. Normally, the intake valve is made from a low alloy steel inasmuch as it operates under cooler temperatures. For long life, both valves are faced with the same high wear resistant material that goes into the valve seat inserts.

3. Semi-Hemispherical Combustion Chamber—Use of the semi-hemispherical combustion chamber design permits a compact arrangement of the valves side by side, which simplifies the push rod arrangement for the multi-cylinder engines in the family. A 6 to 1 compression ratio is used to permit satisfactory operation on 72 octane gasoline. The spark plug is located in a position for maximum power and short flame front travel.

4. Recoil Type Starter Enclosed in Crankcase — Minimum field requirements specify the use of only a manual or rope starter for this size engine. However, in addition to the rope starter, a compact recoil type starter is provided as optional equipment, since it can often be used to advan-

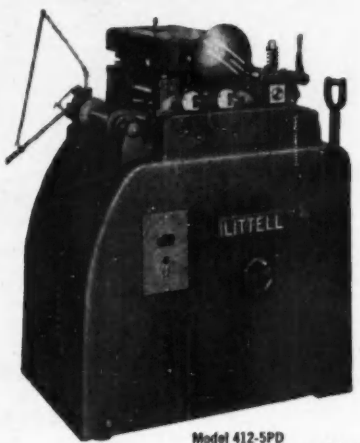
for AUTOMATION
on slitter, shear
or punch press
coil stock



converted to workable
flat stock

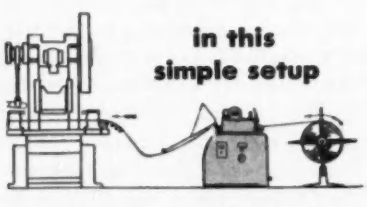


by a LITTELL
Variable Speed
Straightener



Model 412-5PD
5 to 1 variable speed drive
Straightens steel stock up to .125" thick x 12" wide.

in this
simple setup



Coil stock comes out of a Littell Straightener commercially *flat*, in perfect condition for accurate, automatic, high speed work on punch press, shear or slitter. The right straightener for your requirements is in the complete Littell line. *Write for the Littell Straightener Catalog*

F. J. LITTELL MACHINE CO.
4107 N. Ravenswood Ave., Chicago 13

The Tube Line That Rates a Buy-Line!



IN THE DESIGN and building of the products shown here, GM Steel Tubing plays an important part—either for the passage of liquids or gases, or as part of the mechanical structure. And these are but a few of the thousands of manufactured items that use low-cost steel tubing in place of more expensive materials. Examine your own requirements! You, too, may find you can *improve design, speed production,* and *cut costs* with "The Tube Line That Rates a Buy-Line"—GM Steel Tubing!

SEE SWEET'S PRODUCT DESIGN FILE 1a / Ro

RP STEEL TUBING

SEND FOR FREE BROCHURE

This new, illustrated, fact-packed brochure tells how GM Steel Tubing can help solve design and production problems. Send today for your free copy.

ROCHESTER PRODUCTS

DIVISION OF GENERAL MOTORS, Rochester, N. Y., U.S.A.

ALSO MANUFACTURERS OF ROCHESTER CARBURETORS AND ROCHESTER CIGAR LIGHTERS

tage, particularly in cold weather starting. Composed of a wire rope, an engaging gear, and a clock type rewind spring, the starter is mounted inside the crankcase to insure lubrication at all times and to permit the use of a power-take-off shaft on both ends of the engine, if desired. In laboratory tests this starter has been subjected to 33,000 pulls without failure, which is a good indication of its ruggedness.

5. Industry Adopted Bolt Mounting Circle—To facilitate the adapting of end items to the engine, a bolt mounting circle which has been adopted by many high-volume producers of this size engine has been incorporated into the engine design.

6. Heavy Duty Tapered Roller Main Bearings — To provide long life and trouble free operation, heavy duty tapered roller main bearings have been incorporated into the engine design. The bearings receive lubrication from the splash lubrication system of the engine.

7. Four Engine Mounting Pads for Mounting Flexibility — Four mounting pads are provided on the crankcase in lieu of integral feet, to permit flexibility in mounting and to reduce weight. Either all four or only two of the supports may be used, depending upon the application situation.

8. Power-Take-Off Shaft on Both Ends of Crankshaft — An alternate crankshaft will be available with a power-take-off at each end. Certain applications require such an arrangement.

9. Lightweight, Compact, and Long Life — Weight of the engine, less recoil type starter, fuel pump, fuel tank, and heater, has been held to 25 lb. This is comparable to the weight of commercial two-stroke engines of this size. It is approximately 12 in. in length, 14 in. in width, and 18 in. in height, and is capable of operating at least 1500 hours between major overhauls at rated load and speed on military fuel and lubricants.

10. Large Oil Sump Capacity — Sufficient capacity is provided in the oil sump to enable the engine to operate continuously for a 24-hour period, if required, before shutting down for maintenance and oil level checks.

11. Chrome-Plated Cylinder Bore—A chromium plated cylinder bore is provided for long life. An alternate construction utilizing an alloy iron sleeve is provided in the event the supply of chromium becomes critical.

12. Built-in Winterization—A complete winterization system, including a shroud which is a permanent part of the engine, and a small high-output heater, is provided to permit operation in low ambient temperatures. Means are also provided to control the cooling air during operation at high ambient temperatures, without removal of the integral winterization components.

13. Built-in, Self-Contined, Accessory Unit — An ease-of-maintenance feature, this unit contains the breaker points, condenser and the governor. Being a subassembly, it can be assembled, tested separately, and replaced as a complete subassembly if desired. Both breaker points and condenser are easily accessible for adjustment and/or replacement. Since the coil and magnets of the ignition system rarely need replacement, they are placed under the flywheel for compactness.

14. Fuel Pump Drive for Fuel Pump — A cam on the camshaft and a mounting pad on the crankcase are provided for attachment of a fuel pump, should it be desired in lieu of a gravity feed fuel tank.

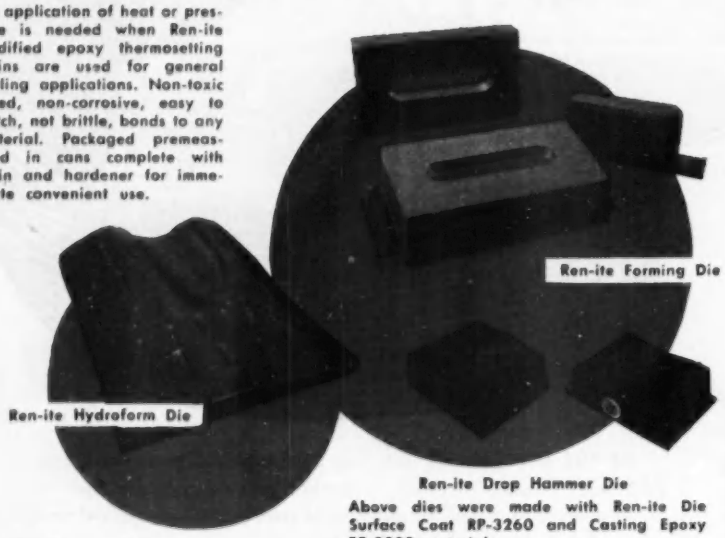
15. Built-in, Precision, Centrifugal Type Governor—For those applica-

(*Turn to page* 130, *please*)

REDUCE YOUR • Tooling TIME 70%
• Tooling COSTS 50%

Use Ren-ite*, the first dimensionally stable tooling plastic, as casting and die surface coat materials for forming, stretch press, hydroform, and drop hammer dies. Users of Ren-ite report savings of up to 70 per cent in tooling time and 50 per cent in cost.

No application of heat or pressure is needed when Ren-ite modified epoxy thermosetting resins are used for general tooling applications. Non-toxic cured, non-corrosive, easy to patch, not brittle, bonds to any material. Packaged premeasured in cans complete with resin and hardener for immediate convenient use.



Ren-ite Drop Hammer Die

Above dies were made with Ren-ite Die Surface Coat RP-3260 and Casting Epoxy RP-3200 materials.

Some of many Ren-ite uses: making master Keller models, spotting racks and duplications; model mock-ups, skin panels, nesting, checking, polishing, and welding fixtures; dies and prototypes, aircraft tools and fixtures, tubing and fittings.

●FREE ENGINEERING SERVICE—NO CONTRACTS REQUIRED ●

Write or phone for complete information and price schedules.

Ren•ite PLASTICS, INC.

POST OFFICE BOX NO. 1256, LANSING 4, MICHIGAN
OFFICES IN CHICAGO, CLEVELAND, DETROIT,
LOS ANGELES, NEW YORK AND ST. LOUIS.

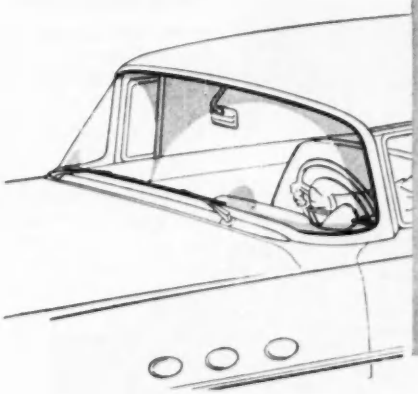


*"Ren-ite," "The Dimensionally Stable Tooling Plastic" and "Comminuted for Quality" are Trademarks of Ren-ite Plastics, Inc.

FIRST and FOREMOST!



King-size windshields and still no wiper slowdown . . . thanks to AC's development of the combination fuel and double-action vacuum booster pump.



It takes power . . . and lots of it . . . to swing a wiper smoothly, unhesitatingly across today's king-size windshields.

You must go back to the early thirties to see how the modern, dependable-action wipers got their dependability. Wipers of that day were powered directly from the manifold. They stuttered, stammered—and failed completely under acceleration or whenever the engine was heavily loaded.

AC solved this problem with the first combination fuel and vacuum booster pump. Here was a dependable source of vacuum power.

But that wasn't the end . . . far from it! In tune with modern design, windshield areas grew and grew — windshields curved. And wiper load went up and up. The answer? AC was first again — with *double action* that raised vacuum pump capacity by 80%!

Because of AC's progressive engineering, drivers are now offered the security of steady action regardless of driving conditions. This is just a sample of why AC leads the field. Bring your automotive problem to AC, too. It will receive prompt attention at any AC office.

AC QUALITY PRODUCTS

FLINT
1300 North Dort Hy.
CHICAGO
Insurance Center Bldg.
DETROIT
General Motors Bldg.

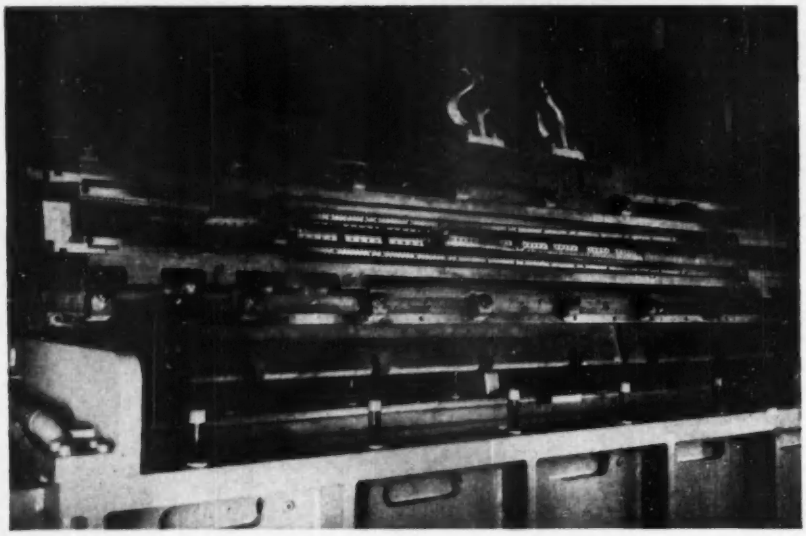
For More than Twenty Years Every Make of Car Has Used One or More AC Products

ADAPTERS (Drive) • **AIR CLEANERS** • **AIR CLEANERS AND SILENCERS** (Combination) • **AMMETERS** • **BREATHERS** (Crankcase) • **CAPS** (Radiator Pressure) • **FLEXIBLE SHAFT ASSEMBLIES** • **FUEL PUMPS** • **FUEL AND VACUUM BOOSTER PUMPS** (Combination) • **FUEL FILTERS & STRAINERS** • **GASOLINE STRAINERS** • **GAUGES — AIR** (Pressure) • **GAUGES — GASOLINE** • **GAUGES — OIL** (Pressure) • **GAUGES — TEMPERATURE** (Water, Oil) • **OIL FILTERS** (Lube) • **PANELS** (Instrument) • **RECIPROCATING VACUUM PUMPS** • **ROTARY VACUUM PUMPS** • **SPARK PLUGS** • **SPEEDOMETERS** • **TACHOMETERS** • **TERMINALS** (Ignition Wire) • **VALVES** (Crankcase Ventilation)

AC SPARK PLUG DIVISION GM GENERAL MOTORS CORPORATION

Here's the exciting story about a **BROACHING MACHINE**

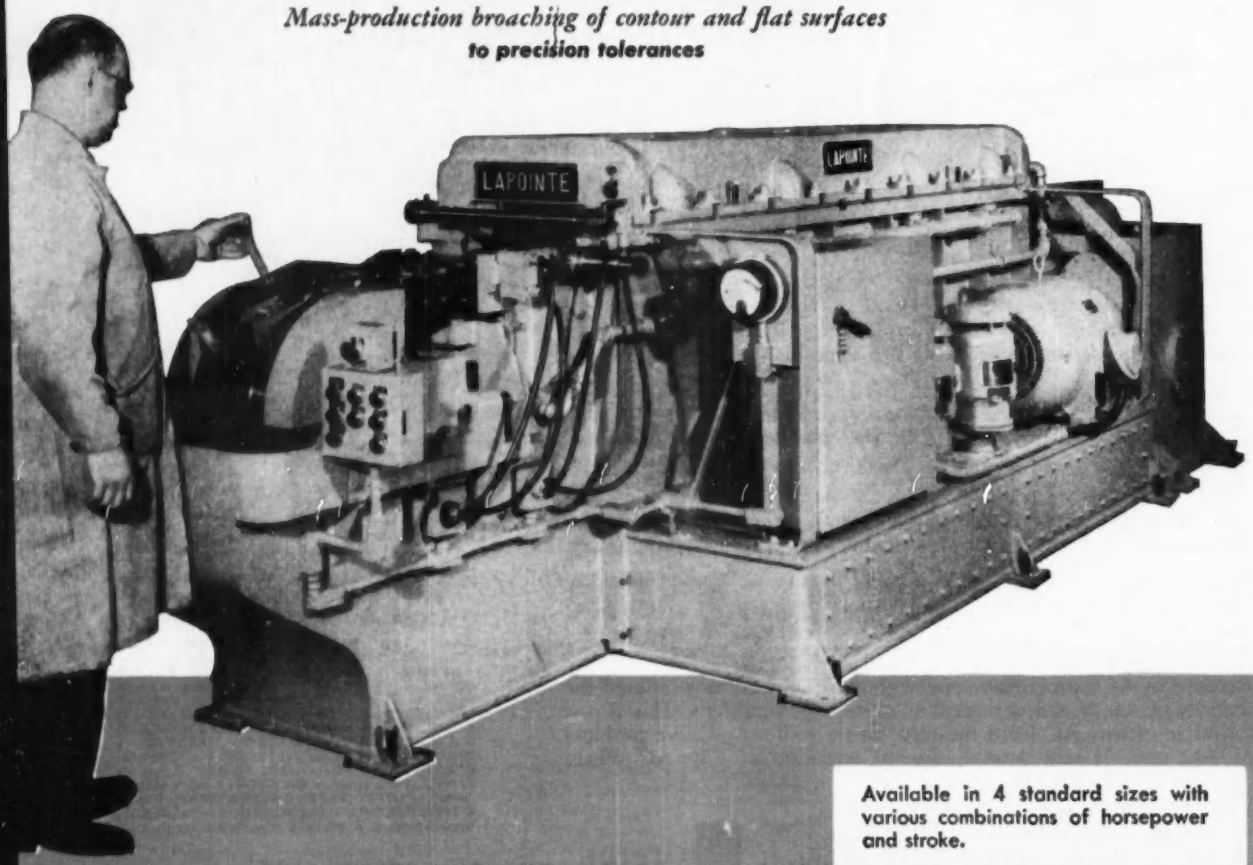
the LAPOINTE



THE BONNET,
or broach-carrying cover, is hinged to the frame and accommodates the main broach assemblies.

Observation Ports
enable the operator to see the condition of the broaches in action.

Mass-production broaching of contour and flat surfaces
to precision tolerances



Available in 4 standard sizes with various combinations of horsepower and stroke.

that DOESN'T STOP!

CONTINUOUS BROACHING MACHINE

RUNS ALL THE TIME

. . . you don't stop it to index
. . . you don't stop it to feed
. . . you don't stop it at all
(it's the nearest thing to perpetual motion!)

THE PARTS MOVE — NOT THE BROACH!

A powerful, matched-twin-chain drive is fitted with a series of individual fixtures (*designed by Lapointe*) that are completely automatic: self-operating, self-locating, self-clamping, and self-releasing. The operator merely drops the parts into the work nests.

FABULOUS PRODUCTION IS POSSIBLE

For instance, production of more than 1400 automotive connecting rods per hour has been maintained, broaching the sides, joint face, and half-round. 1400 . . . 1700 . . . 2000 parts per hour can be broached under full automation, with the optional hopper feed. What can this mean for you, on parts that you are not now broaching? Here is precision with production, and the great advantage of machined surfaces!

• • • •

Exceptionally heavy and rigid design assures smooth operation, long tool life, and excellent broaching finish. Completely fool-proof, the machine will stop automatically if parts are incorrectly positioned in manual loading.

FEATURES

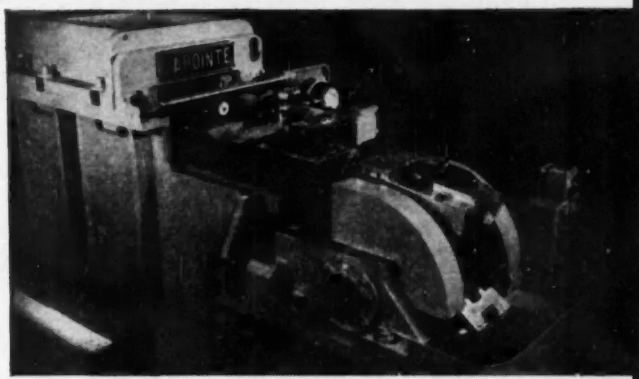
Engineered for ease of loading.

Broached part automatically releases at rear of machine onto suitable conveyor.

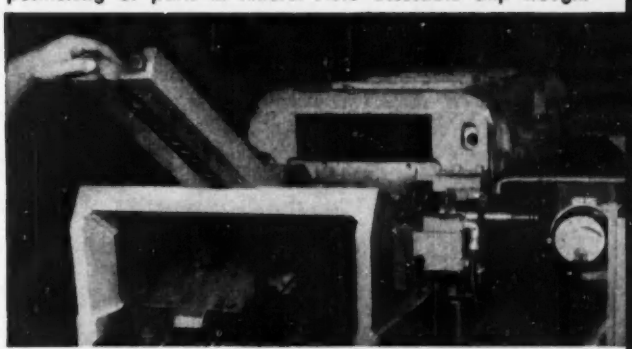
Multiple speeds. Changes in pick-off gears can easily and quickly be made.

Plus: Electric brake, for instant stopping; segmented sprocket, for simplified maintenance; two individual coolant pumps, for dependable flow; shear pin coupling, in convenient location.

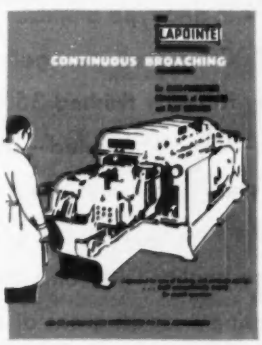
LAPOINTE does the whole job! We assume 100% responsibility because we build the machines, tools, and fixtures!



Front of machine, showing safety stop (the round white disc under Lapointe name-plate.) This safety stop assures positive positioning of parts in fixture. Note accessible chip trough.



Lends itself to **FULL AUTOMATION** when equipped with hopper feed.



Get precision results at reduced costs!

Every plant that is now mass-producing parts should investigate the Lapointe Continuous Broaching Machine with its many superior advantages. Send for descriptive bulletin CH-10.

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES



A leader in the field, The Gabriel Company, Cleveland, uses the Ransburg No. 2 Process to apply the protective coating to its line of shock absorbers which vary in size from 4" to 26" in length.

● Efficiency and production in the finishing of shock absorbers progressively improved at The Gabriel Company, when—over a period of years—they went from dip to Ransburg No. 1 Process, then to the Ransburg No. 2 Process, with the disc-type atomizer.

Efficiency was stepped up measurably when the No. 1 Process of electrostatic spray painting replaced dip method in the application of the protective coating to the completely-assembled shocks.

NOW, with the even-more-efficient No. 2 Process—with disc-type atomizer—Gabriel is painting 1000 pieces per gallon of paint where they formerly finished 350! Production is up, too—almost doubled—jumping from 1000 to nearly 2000 units per hour. In addition to paint savings, they are getting a consistent, high quality finish and an even, protective coating over all areas of the product.

This is another on-the-job example of what Ransburg No. 2 Process is doing on production lines all over the country. We'd like to talk to you about the possible savings in your finishing department. Or, write for our brochure on Ransburg Electrostatic Painting Processes.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana
RANSBURG

Small Engine Standardization

(*Continued from page* 126)

tions requiring close speed regulation, a built-in, precision, centrifugal type, mechanical governor is provided with short linkage and anti-friction bearings. The linkage between the governor and the carburetor is a flexible push-pull cable which is located within a length of steel tubing for protection from freezing rain and snow as well as for continuous lubrication.

16. Forged Crankshaft with Hardened Journals—An alloy steel forged crankshaft with induction hardened journals is provided for high strength and for high wear resistance. In the interest of standardization, a standard crankshaft end configuration has been adopted for use on the engine. This, in effect, means that each end item will have to be adapted to the engine rather than the reverse, which is now common practice, and which results in the need to stock several different crankshafts.

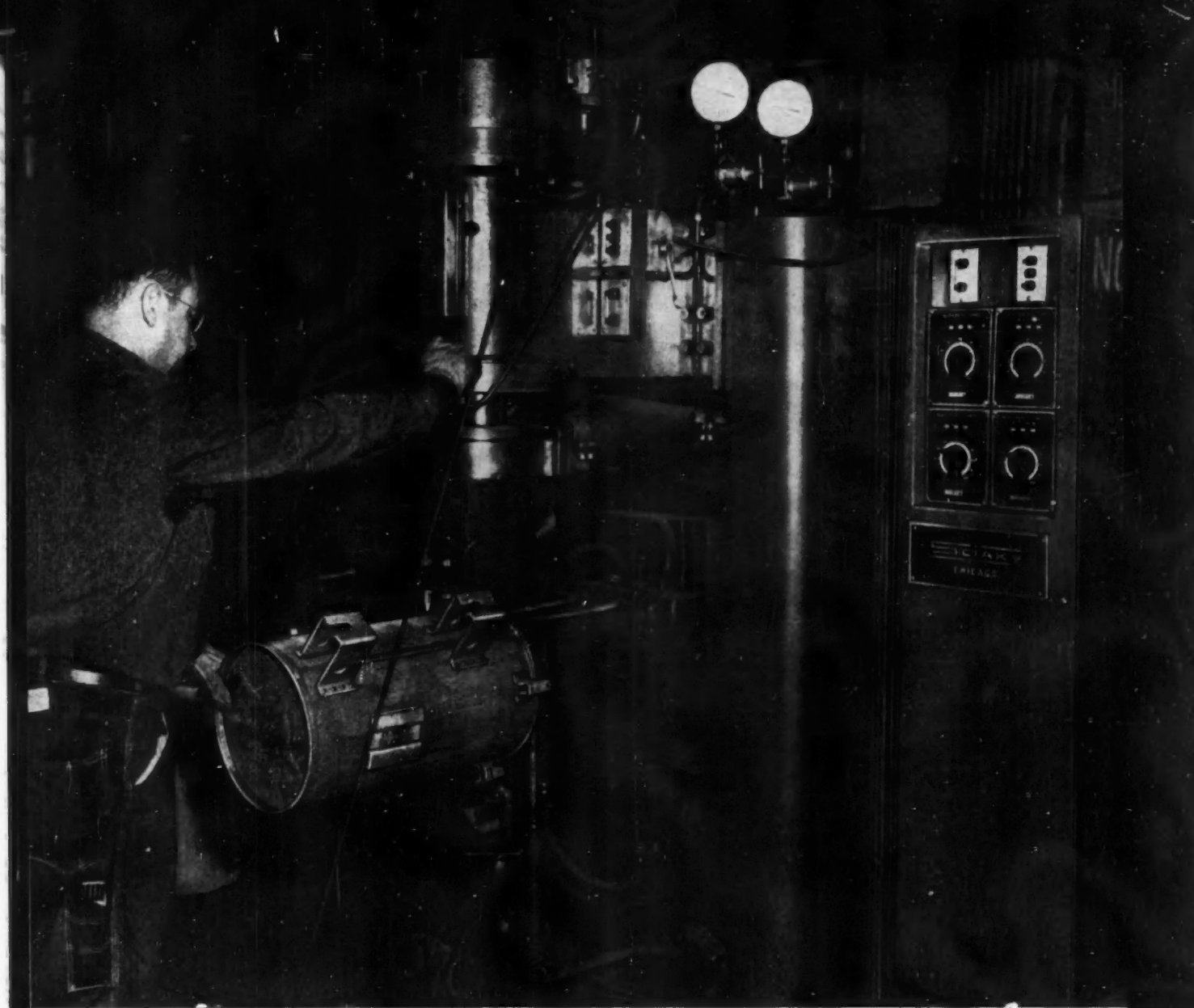
17. High Interchangeability of Parts Among Sizes—A basic objective of this development is to achieve maximum interchangeability of parts between engines in the family. Actually, approximately 30 per cent of the component parts and hardware used on the 1½-hp engine are interchangeable with those used on the 3-hp engine in the family.

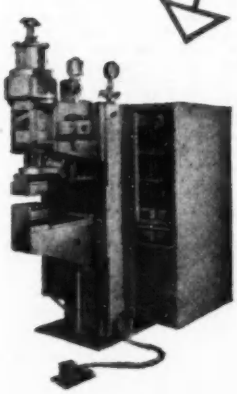
18. Large Capacity Oil Bath Air Cleaner—An efficient, large capacity oil bath air cleaner is provided to permit longer operating periods between servicing.

19. Radio Suppressed to Army Specifications—The engine is suppressed to eliminate radio interference in accordance with Army Specification MIL-I-11683.

20. Piston Rings Interchangeable with Military Standard Piston Rings—The piston rings used in this engine are interchangeable with the 2¼ in. diameter Military Standard piston rings established for larger gasoline engines in the High Mortality Parts Standardization Program. This is a dividend feature, inasmuch as parts are used which will already be in the supply system.

21. 18-mm Spark Plug for Long Life—To provide additional space for lead deposits to build up before shorting out the electrodes, and therefore insuring longer operating periods between servicing, an 18-mm spark





Resistance Welding Assembles up to 590 Transformer Tanks per Day

The Distribution Transformer Tank Department at Moloney Electric in St. Louis, Mo., uses a minimum number of Sciaky patented Three-Phase welders for a maximum number of operations.

In diameters of 10" to 30" and lengths of 21" to 54", the 12 and 14 gauge tank's side seam, flanged bottom, cooling fins, and as many as 12 internal and external fittings are resistance welded by only five Sciaky Three-Phase machines. No skilled workers are required to maintain consistency of operation necessary for inspection or production quota. Moloney records indicate no mentionable downtime during the last two years . . . For complete details on this unusually efficient resistance welding application, write for R.W.A.W. Vol. 3, No. 7.

The Resistance Welding Department at Moloney Electric is another fine example of Sciaky's basic thinking of welder design to do *more useful work* at *lowest operating cost* with *maximum reliability.*

Largest Manufacturers of Electric Resistance Welding Machines in the World

SCIAKY

4925 W. 67th Street, Chicago 38, Illinois

plug was used in this engine rather than a 14-mm spark plug as is used in most commercial engines of this size. With this plug an operating life of 500 hours between cleanings has been obtained in laboratory tests.

Procurement

In general conformance with the time schedule discussed above, the Engineer Research and Development Laboratories will finalize, for procurement purposes, military drawings and military specifications, complete with quality control and materials information for use in procurement of the new standard military design engines. It has not been determined whether production will be accomplished by voluntary tool up by private industry, construction of a complete Government plant or plants, Government tooling in private plants on a stand-by basis, Government tooling in private plants on a rental basis, or some other arrangement.

Summary

Based on the general guidance of an Industry Advisory Committee to the Department of Defense (formerly advisory to the Munitions Board), the Corps of Engineers expects to meet the military requirements for industrial type gasoline engines by two basic approaches:

1. Medium and large size engines will be basically commercial types, incorporating standardized, interchangeable, high mortality parts and accessories to reduce the number of high-mortality spare parts by 90 to 95 per cent, and

2. The development of a military family of small gasoline engines with maximum standardization and greatly increased performance over commercial versions.

The interchangeable parts program entered the quantity procurement phase in July, 1952, and will be extended during this calendar year to all cylinder bore sizes now planned for inclusion. The development of the military family of small size (½- to 20-hp) industrial type gasoline engines has progressed to the point where the first size (1½-hp) is expected to be ready for limited quantity procurement in 1955, with the additional sizes following at intervals over a period of several years. Production planning has been initiated to assure availability of the new engines in quanity to meet all industrial engine requirements of the Army in this horsepower size range.

STAINLESS fastener in STOCK

All types and sizes of screws (hex head, Phillips, slotted, socket), bolts, nuts, washers, rivets, keys and pins



- Over 9000 items in stock means *immediate delivery* from one source
- New Garden City plant now operating at *top speed and quality*
- Unsurpassed facilities for quantity fabrication of *specials*
- A staff of *seasoned* engineers always available for consultation
- *Pioneers* in the manufacture of stainless steel fasteners

WRITE NOW FOR FREE COPY OF FASTENER MANUAL P3

MANUFACTURERS SINCE 1929
ALLMETAL
SCREW PRODUCTS COMPANY, INC.
GARDEN CITY NEW YORK

BOOKS . . .

WIND TUNNEL TESTING, *by Alan Pope, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price, $8.50.* The purpose of the second edition is two-fold; in the light of recent developments in high speed aerodynamics, the author has revised earlier data and procedures where changes are justified; and he has extended the scope of the book to embrace a number of techniques not available at the time the first edition was prepared. New are chapters covering testing at near-sonic, transonic, supersonic, and hypersonic velocities. The testing of helicopter rotors is given extensive treatment, and the author suggests experimental ways in which wind tunnels can be used in non-aeronautical capacities.

ELEMENTARY TOOL DESIGN, *by Elmer B. Benson, published by Chas. A. Bennett, Peoria 3, Ill. Price, $4.76.* This book shows the "how to" of creating and drawing working designs used by the skilled machinist or toolmaker in making "mass production" tools. It is confined to the principles of good design, rather than complex technical discussions, and shows how the following factors directly affect the design of any tool; quantity of production; simplicity of operation; type of machine the tool is to be used on; ability of the tool to withstand wear and tear; size and kind of material available for making the tool; special shop practices (including variables and standards).



....before Northwest developed Acid Solvent Emulsion Cleaner #1."

Northwest's Acid Solvent Emulsion Cleaner No. 1 completely and quickly removes soil from aluminum parts, preparing the surface for plating, painting, anodizing, zinc chromate priming or other finishes.

Acid Solvent Emulsion Cleaner No. 1 is fast cleaning, easily rinsed and controlled, readily-emulsified, and economical. It is non-toxic, non-corrosive to equipment, and non-injurious to the metal regardless of immersion time or bath temperature.

Northwest's production-tested chemicals and "Right the first Time" recommendations will save you money. A Northwest Cleaning Specialist with the complete story on Acid Solvent Emulsion Cleaner No. 1 or any of the other great Northwest Chemicals is as close as your phone or write for descriptive literature.

Got a Problem?
Let our Cleaning Specialists help you!



Remember —**YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER**





Whether you build cars, trucks, buses, or off-the-highway equipment, the new Exide ULTRA START® will add prestige, performance and extra sales appeal to your product. It's the greatest battery in Exide's 66 year history!

ULTRA START Batteries, with the new dual-purpose Levelex* for seasonal control of electrolyte level, deliver increased power in cold weather . . . meet heavier starting loads. In hot weather they withstand high under-hood temperatures. Their corrosion-fighting grid alloy, Silvium®, resists overcharge, assuring longer, "healthier" battery life!

No matter how exacting your battery requirements, you can always count on Exide. 13 plants throughout the nation assure prompt service and factory-fresh batteries, for gas or diesel applications.

Exide AUTOMOTIVE DIVISION

Exide BATTERIES

All TABLOID

(Continued from page 37)

Air Associates, Inc., has formed a new International Div. . . . International Nickel Co. has established Constructional Alloy Steels, Electroplating, Inco Nickel Alloys Development, and Stainless Steel and Heat-Resistant Alloys sections in its Development and Research Div. . . . National Vulcanized Fibre Co. has merged its Fibre Specialty and Phenolite Divs.

* * *

Douglas Aircraft Co. has opened a new $2 million engineering building at its El Segundo Div. . . . Fletcher Aviation Corp. has dedicated the first unit of its new 121,000 sq ft plant.

* * *

Standard Oil Co. (Ind.) has contracted with the Air Force to build and operate a plant at Seymour, Ind., for research and testing of new types of rocket propellants.

* * *

Glass Fibers, Inc., has established a Western Div. . . . Milwaukee Metal Working Co. has changed its name to Wisconsin Hydraulics, Inc. . . . Empire Steel Castings, Inc., has completed an $800,000 expansion program.

* * *

Lockheed Aircraft Corp. has appropriated $10 million for a new advanced research laboratory for its Missile Systems Div. . . . Convair will erect a $250,000 test facility on Point Loma, Calif., for guided missile testing.

* * *

Goodyear Tire and Rubber Co. is ready to market tubeless tires for all types of airplanes. Some are now being test-flown.

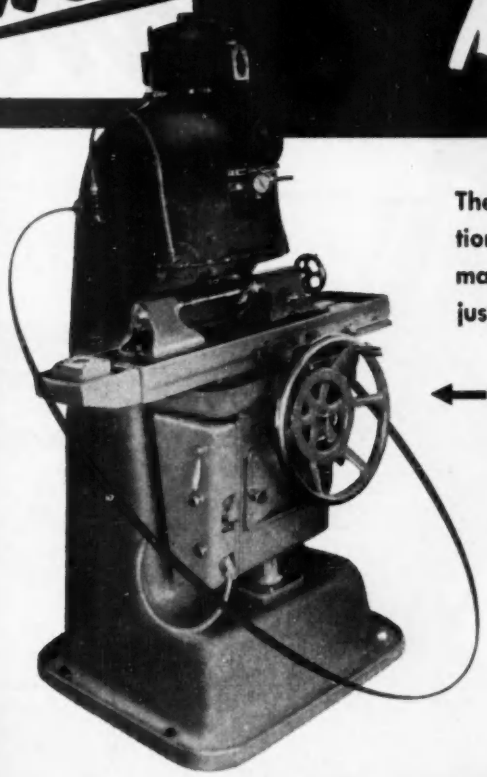
* * *

General Electric Co.'s Electronics Div. expects to begin volume production of transistors later this year. . . . The company's Silicone Products Dept. has completed a project making radioactive silicones available for medicine and industry.

* * *

Distrene, Ltd., is name of new company associated with Dow Chemical Co. to manufacture Styron, Dow's polystyrene plastic, for molders in the British Isles.

NOW IS THE TIME TO Cut Manufacturing Costs



The one sure way of meeting today's competition is with today's machine tools. The older machines were all right in their day but they just haven't got what it takes now.

← **For instance,** it took this old Red Ring Model GCC 60 seconds to shave a gear like the one shown. →





Model GCU today finishes that same gear in just 16 seconds—and to much closer tolerances, too.

In an 8 hour day the GCU will deliver 375% of the production of its predecessor.

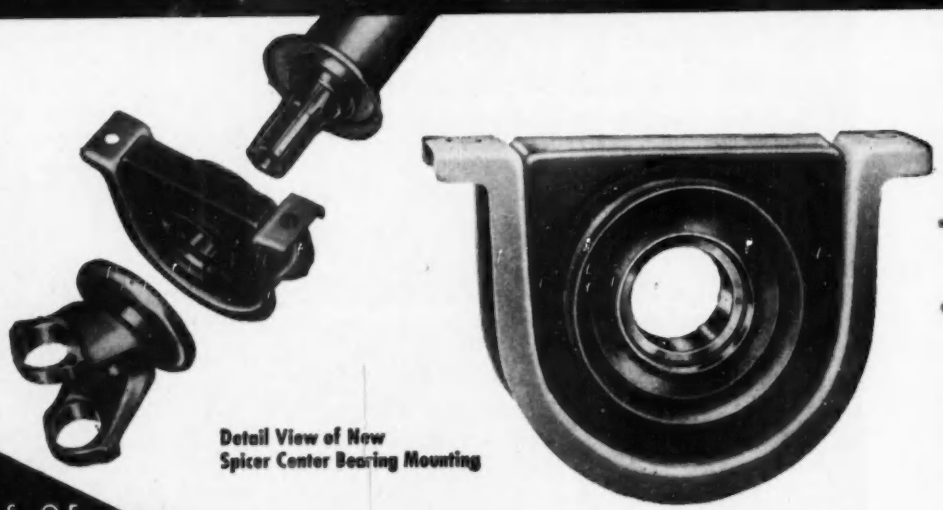


NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

Man,



Detail View of New
Spicer Center Bearing Mounting

50 YEARS OF
Spicer
SERVICE

DANA CORPORATION

what a relief!

Revolutionary New Spicer Center Bearing Mounting for Spicer Propeller Shafts

REDUCES VIBRATION UP TO 80%
LENGTHENS TRUCK AND PARTS LIFE
LESSENS DRIVING FATIGUE

Happy days ahead, for many drivers of 1955 trucks!

The new Spicer Center Bearing Mounting has put the shackles on destructive, annoying propeller shaft vibration ordinarily transmitted through center bearing supports!

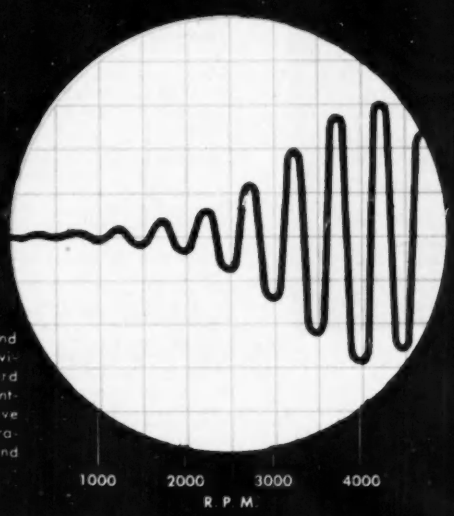
Gone is the propeller shaft hum . . . the buzz . . . the penetrating, nerve-wracking oscillations that weary the driver's body and wrack the truck's frame.

The Spicer Center Bearing Mounting embodies a revolutionary combination of ball bearing and low-frequency rubber. This achieves remarkably low vibration transmissibility at driving speeds. It dampens . . . deadens . . . absorbs nearly all the vibration disturbances transmitted to it from the drive line.

The new Spicer mounting is an outstanding engineering advancement. It is as momentous and far-reaching in effect as the now-famous soft-rubber engine mounting principle. One ride in a truck equipped with this Spicer unit will quickly prove its driver-saving, truck-saving ability.

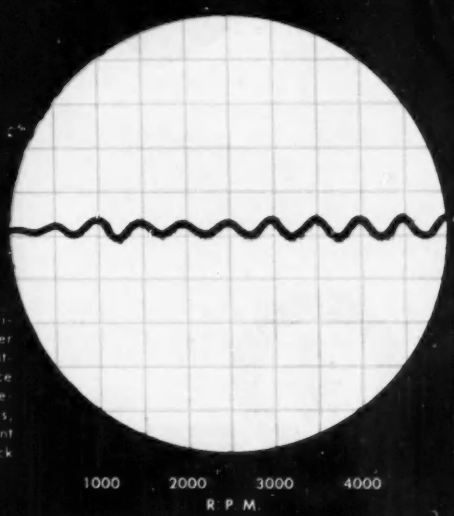
The new Spicer Center Bearing Mounting is available for original truck equipment, as an integral part of the Spicer Propeller Shaft assembly. It is another Spicer engineering "first," typical of Spicer pioneering that has been dedicated to the advancement of the automotive industry.

Oscillometer Recording of Standard Center Bearing Mounting



Extreme variation and high frequency of vibrations in standard center bearing mounting cause excessive and destructive vibration to both truck and driver.

Oscillometer Recording of New Spicer Center Bearing Mounting



Small modulus of vibration in new Spicer Center Bearing Mounting indicates absence of annoying, trouble-making frequencies, assuring more pleasant and profitable truck operation.

TOLEDO 1, OHIO

SPICER PRODUCTS: TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER and AUBURN CLUTCHES

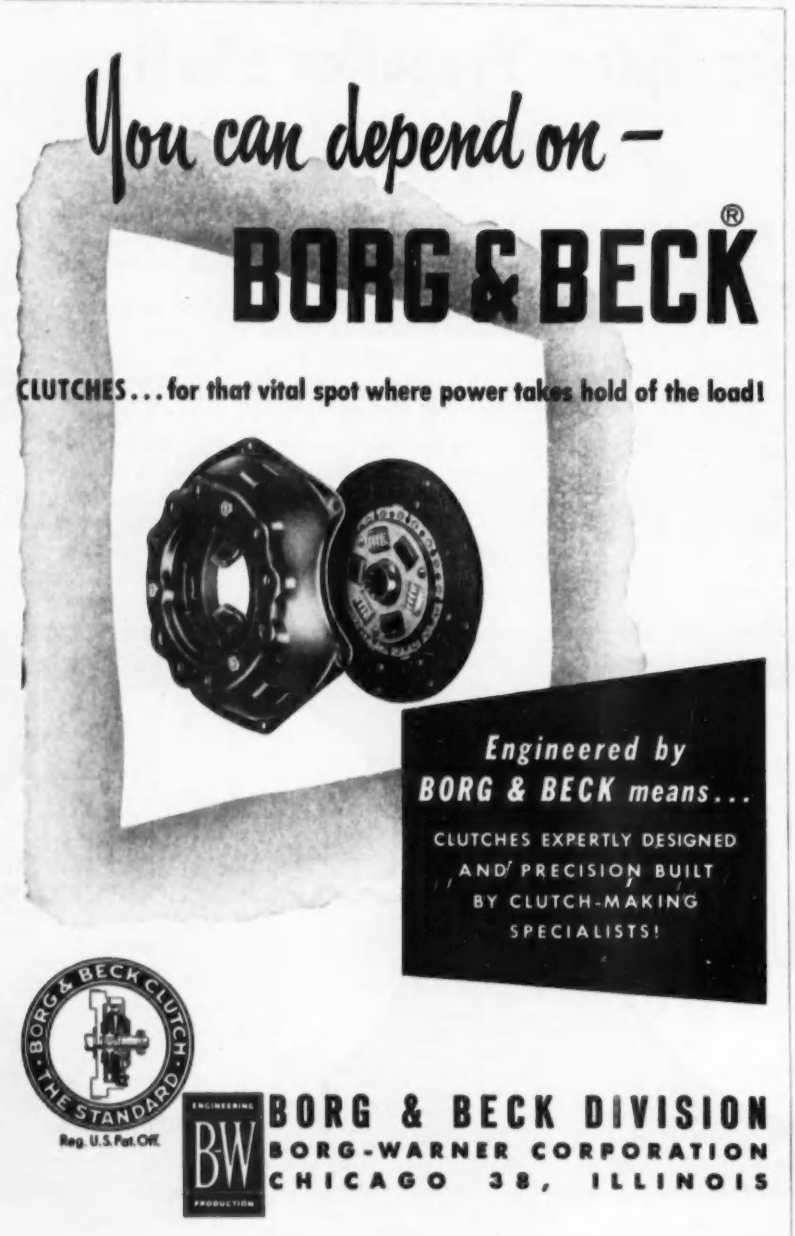
AMA Report on Air Pollution Given at SAE West Coast Meeting

(*Continued from page* 100)

efficiency of the gasoline engine, according to B. M. Sturgis, E. I. du Pont de Nemours & Co., Wilmington, Del. He hoped that progress would be made toward more efficient fuel utilization, but explained that mutual adaptation of fuels and engines has been handicapped by lack of definite knowledge of the nature of combustion knock. "Development of an understanding of knock processes has been slow due to the rapid and complex nature of the reaction, the difficulty of making precise observations of knock in an engine, and the difficulty of reproducing knock outside of engines." Sturgis added that, in recent years, the improvement of techniques and refinements of instrumentation, plus greater knowledge of rapid chemical chain reactions, have contributed to understanding.

Sturgis explained that knock takes place in the last portion of the engine charge to burn, usually under conditions of high temperature and pressure. These accelerate chemical reactions and cause the unburned portion of the charge to burn at such a rapid rate as to create a shock wave impinging on the cylinder wall and producing a knocking sound. He asserted that the occurrence of knock is controlled by the nature and extent of pre-flame reactions prior to fuel combustion. While these reactions are complex, he continued, knock is believed to result from relatively simple specific reactions initiated by species containing only hydrogen and oxygen. He expressed the opinion that the hydrocarbon structure influences the rate of accumulation of sufficient quantities of the hydrogen-oxygen species to cause knock, adding that such additives as tetraethyl lead apparently diminish knocking by delaying the later stages of reaction.

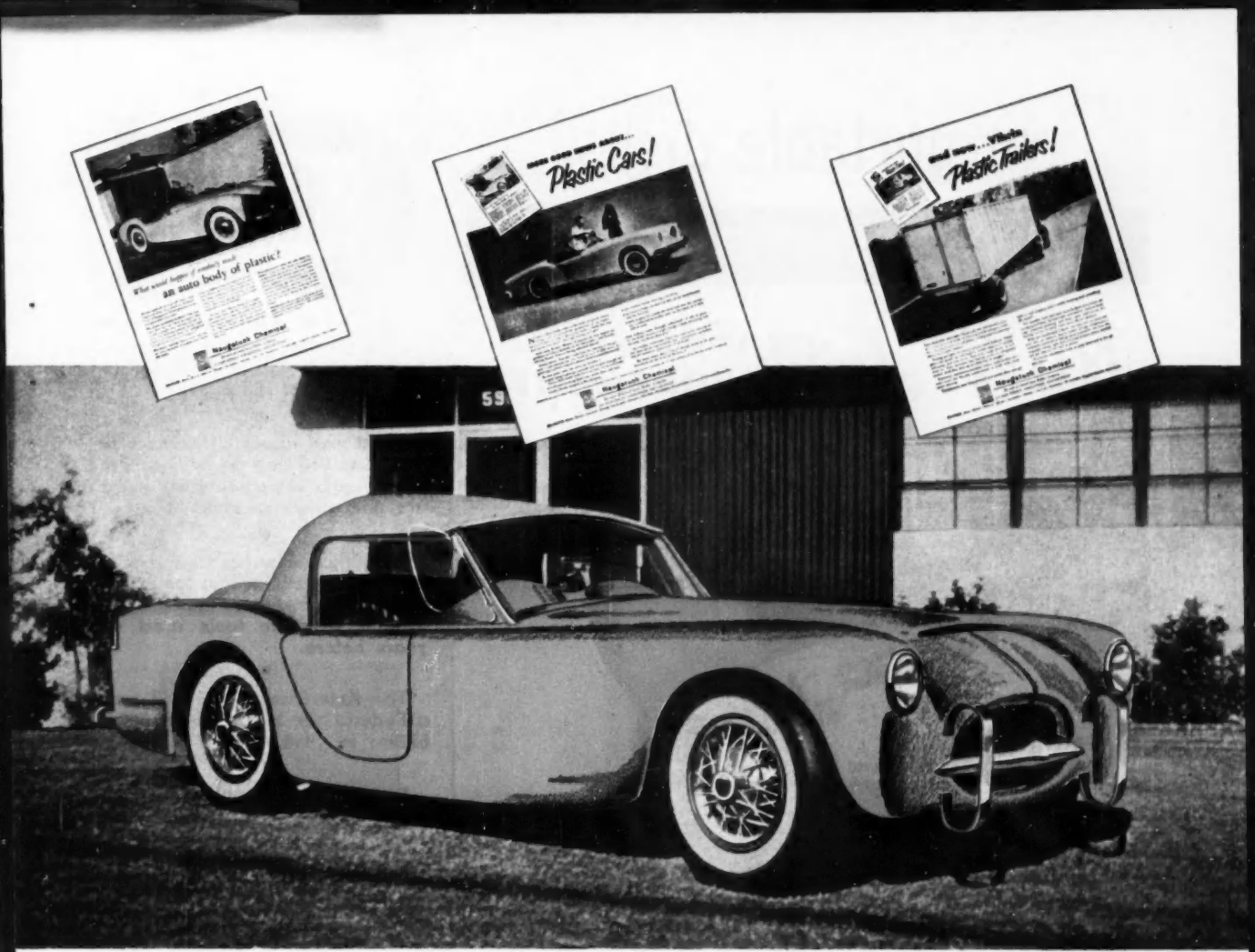
The meeting, sponsored by the SAE Diesel Engine, Fuels & Lubricants, Transportation & Maintenance, and Truck & Bus Activities, had the cooperation of eight SAE West Coast Sections and Groups. General chairman was B. T. Anderson, Union Oil Co. of Calif.



BOOKS ...

METAL STATISTICS, *published by American Metal Market, 18 Cliff St., New York 38, N. Y. Price, $3.00.* The book is widely known in the ferrous and nonferrous metal industries throughout the U. S. and in many parts of the world. It contains up-to-date, as well as historical, records of production, consumption, stocks, imports and exports, monthly and annual market price averages, as well as information on miscellaneous economic subjects.

A PSYCHOLOGICAL APPROACH TO ACCIDENTS, *by Norman R. Lykes, published by Vantage Press, Inc., 120 W. 31st St., New York 1, N. Y. Price, $2.95.* Accident proneness—a condition which is increasingly claiming the attention of psychologists, industrialists, and safety officials—is not easily overcome. Leading authorities on accident prevention have concluded that between 80 and 90 per cent of all automobile accidents are motivated by psychological factors, and it has been further discovered that a majority of all accidents are caused by a minority of drivers. The author, therefore, recommends a completely new approach to automobile accidents, taking full account of the psychological aspects.



Look at the latest in PLASTIC CARS!

Since Naugatuck introduced its first Vibrin® plastic-bodied car, the Alembic I, plastic car bodies have become about the most exciting idea in motordom!

- That original experimental car has been proved in over 65,000 miles of severe service—its dent-proof, rust-proof body of reinforced Vibrin as sound as ever!
- Every major auto manufacturer is now working with plastic bodies, experimenting with mass production techniques!
- Two major American firms already have plastic-bodied production sport cars on the market!
- Reinforced Vibrin truck trailers now roll the nation's highways!

And now Naugatuck presents the Alembic II—a new and finer version of the car that captured the excitement of the nation—helped set the pace for the tremendous strides of the last few years. Its advanced polyester resin, Vibrin 151, has even greater bond to glass fibers, improved torque tolerance—allows faster curing—and can be formed by hand lay-up, vacuum or pressure bag molding, or matched metal dies.

In gleaming gold to commemorate Naugatuck's 50th Anniversary, the Alembic II symbolizes the truly golden promise this remarkable Vibrin plastic offers—not only in auto bodies, but in trucks, trains, building materials, in new and wonderful applications uncounted.

For more on plastic cars, or Vibrin, the material of which they are made, write on your letterhead to the address below.

Naugatuck Chemical

Division of United States Rubber Company

26 ELM STREET, NAUGATUCK, CONNECTICUT

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • **IN CANADA:** Naugatuck Chemicals, Elmira, Ontario

in portable drills

YOUR BEST BUY IS BUCKEYE

NOW! 5 IMPORTANT IMPROVEMENTS

360° EXHAUST DEFLECTOR
NOW—an exhaust deflector to satisfy every tool operator, can be positioned anywhere in full 360° circle.



✔ **PACKAGE VALVE**
NOW—all valve parts can be removed in one unit for inspection, cuts maintenance time and costs.

✔ **QUIETER OPERATION**
NOW—new design developments have improved the noise factor, make Buckeye air drills more quiet than ever.

✔ **MORE INTERCHANGEABLE PARTS.** NOW—identical cylinders on all "A" Series drills, all handle types, permits smaller parts inventory.

✔ **PALM-FIT HANDLE**
NOW—a tool completely free from annoying projections and angles, fits the hand in an easy, natural grip.

NOW—five important improvements have been added to Buckeye air drills, now more than ever your best buy! These are the drills tool room foremen prefer and tool operators ask to use!

No Buckeye tools in your plant? Then select your air tools by comparison, not habit. We'll be glad to put a Buckeye tool on trial in your plant . . . just tell us where and when, we'll do the rest and let you compare. Naturally, there's no obligation.

Buckeye Tools CORPORATION
DIVISION 21 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

SHORTIES

Today, the American worker has about 7½ hp at his fingertips —the power of 165 big men.

•

Right now almost 1000 miles of turnpikes, costing $1 billion, are in use, and another 1000 miles are under construction.

•

It has been calculated that a 1947 automobile selling for $1,500 would have cost more than $50,000 if built with the tools used 40 years before.

•

The American people will pay a Federal tax bill of about $67.6 billion in 1954.

•

In a single month the U. S. scraps as many cars and trucks as the total still in use in all of India.

•

Many automotive roller bearing parts are ground to tolerances of 2/10,000ths of an inch, then sorted into groups with variations of only 5/100,000ths of an inch before assembly.

•

It takes 1800 different kinds of jobs to get oil from the ground to the consumer.

•

The American people consume more than 306 million gal of petroleum products every day of the year.

•

At one major airframe company, 18 per cent—almost one of every five—of the total employees is engaged in engineering, research and development work.

•

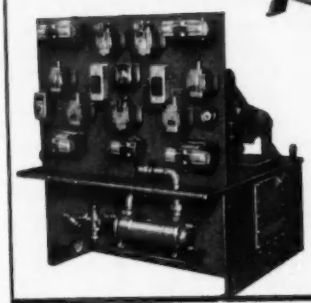
More U.S.-built aircraft will be shipped to foreign nations this year than at any time since the end of World War II.

•

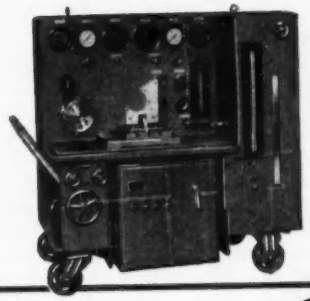
The electronic equipment alone on a modern all-weather fighter weighs more than the entire first Wright military plane.

Pulpit type power unit provides full visibility, easy accessibility.



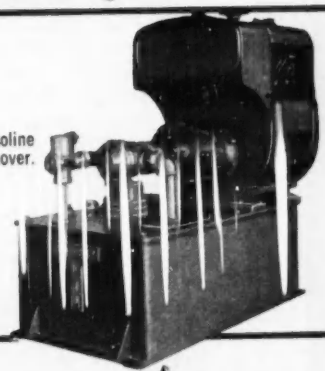


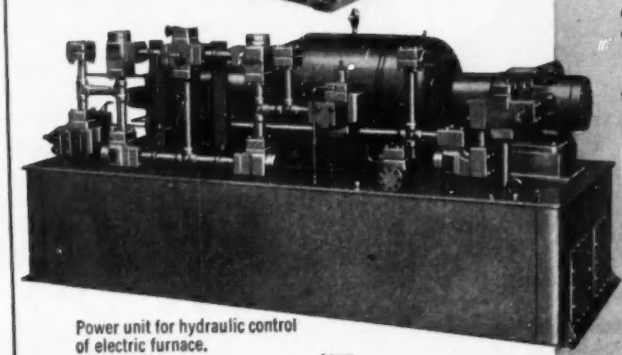
Compact power unit showing gasket-mounted valves.



Portable power unit for testing pumps.

Power unit with gasoline engine as prime mover.





Power unit for hydraulic control of electric furnace.

6837

Individually Designed to Meet *SPECIFIC* Needs

VICKERS®

Custom Built

HYDRAULIC POWER UNITS

DEPENDABLE PERFORMANCE

IMPROVE AND SIMPLIFY DESIGN

REDUCE INSTALLATION COST AND TIME

EASIER SERVICING

BETTER APPEARANCE

Vickers engineers approach the design of a custom-built hydraulic power unit from the standpoint of the customer's INDIVIDUAL needs. The sole objective is to meet HIS requirements with the best hydraulic "package". This assures the most compact, efficient and convenient hydraulic equipment for the particular machine.

A Vickers Hydraulic Power Unit includes all necessary pumps, valves, intermediate piping, oil reservoir, motors, controls, etc., as well as all hydraulic accessories (oil filters, air cleaners, oil level gauges, fittings, etc.). Hydraulic connections can be grouped in a convenient manifold.

In addition to the advantages mentioned above, each Unit is pretested at the factory and ready for immediate operation. Vickers undivided responsibility for the entire hydraulic control system is also an important feature to both the machine builder and his customer. Write for Bulletin 52-45.

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

1428 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: • ATLANTA • CHICAGO AREA (Brookfield) • CINCINNATI • CLEVELAND • DETROIT • HOUSTON LOS ANGELES AREA (El Segundo) • NEW YORK AREA (Summit, N.J.) PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) SEATTLE • TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Prospects for Torsion Bar Suspension On American Passenger Cars

(*Continued from page 65*)

bar ends and, in fact, shaping the entire bar to such close dimensional tolerances as to reduce machining and grinding. Both methods assure high productivity as well as a reduction in equipment and operational sequence.

At this point we may profitably refer to the article "Versatile Tooling for Making Torsion Bars" (see AI, May 15, 1953) describing the facilities of Maremont Automotive Products, Inc., for producing torsion bars for military requirements. In connection with this article, we have been advised by Maremont that the company is definitely in a position to serve as a commercial supplier of torsion bars for automotive suspension. It is only natural that the experience and know-how gained in making torsion bars for military vehicles can be turned gainfully to this end.

Maremont believes that the methods to be used in making automotive torsion bars will depend upon the character of the suspension. The company already has developed special mass production techniques at relatively low cost for several different types of suspensions and end connection requirements.

What is most important is that Maremont has carried on a program of investigation and testing on torsion bar characteristics, as well as the effect of production techniques such as presetting, shot-peening, end connection design, and heat treatment, and their effect on fatigue life in various stress ranges. This body of information could be invaluable to producers investigating this type of suspension system.

Mather Spring is another specialist that has had considerable experience with torsion bars and, in fact, is the source for some of the equipment in automotive use today.

It is common knowledge that most motor car manufacturers have experimented with torsion bars suspension, primarily at the front end, over the years. It may be recalled that when Kaiser-Frazer first started business at Willow Run they intended to introduce a front drive car with torsion bar suspension. Here it was a natural because space is at a premium with front drive arrangement.

Studebaker did considerable work with torsion bars immediately at the end of WW II and, in fact, may have been on the verge of adopting it were it not for the economic conditions at the time.

This front suspension, as illustrated, had the long bar mounted parallel to the frame side rails, with the fulcrum at the upper suspension arm, and anchored to a bracket on the side rail. These bars were about one-in. in diameter, ground, shot-peened, and preset. Incidentally, the ends were upset square for simplicity of mounting, the square section being tapered.

A somewhat similar system also was tested in a ½-ton Studebaker truck at the same time. As illustrated, the bar was mounted outside the frame side rail, the square end being retained in a flange as seen at the left. The fixed end, extending to within the front hanger of the rear

(*Turn to page 151, please*)

Chicago RIVET "912"
AUTOMATIC RIVET SETTER
CUTS COSTS 3 WAYS



1 FASTENS FASTER . . . Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES Quick change rotary hopper and raceway makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

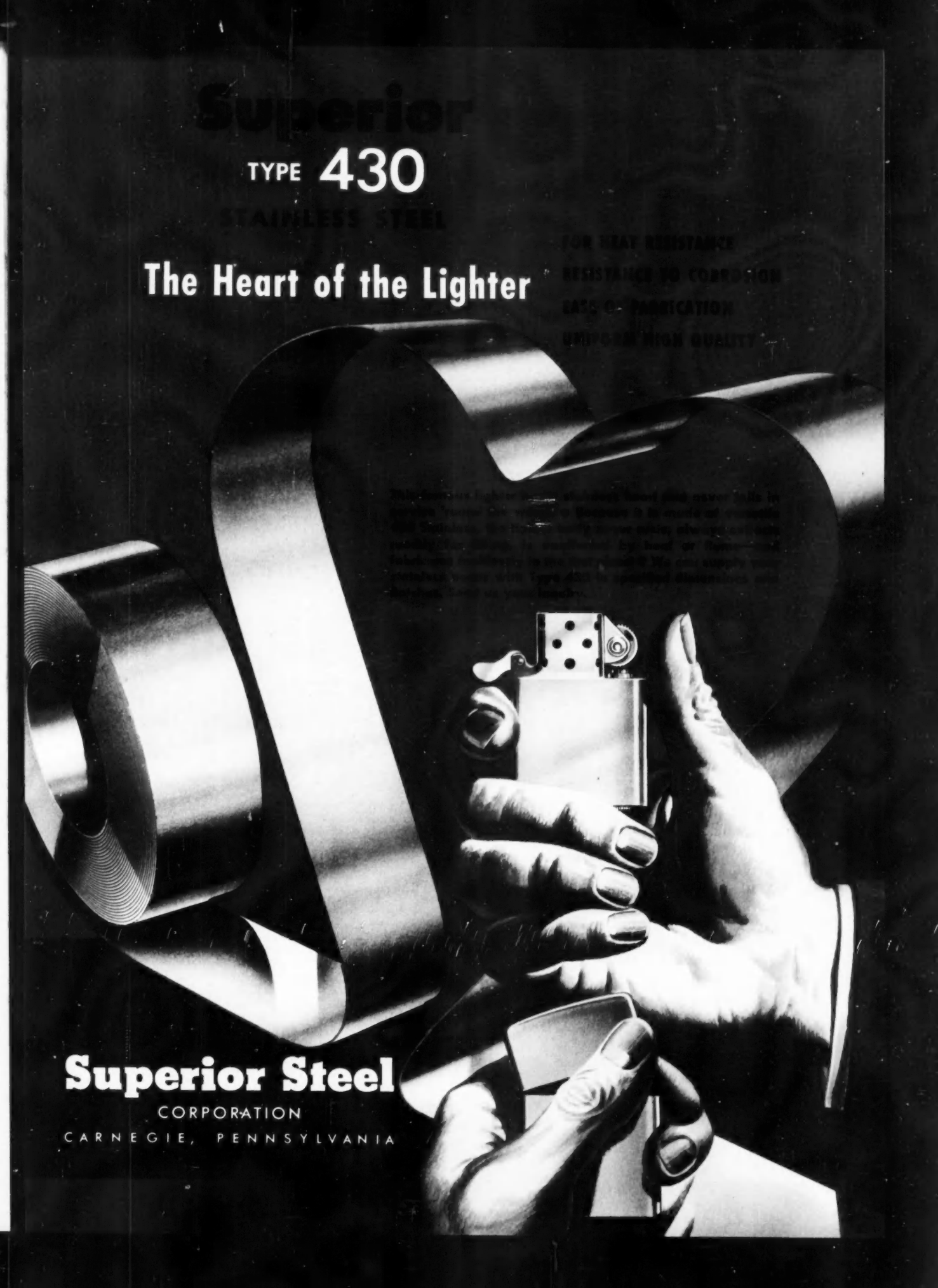
3 SAVES ON MAINTENANCE . . . The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 15/16" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.

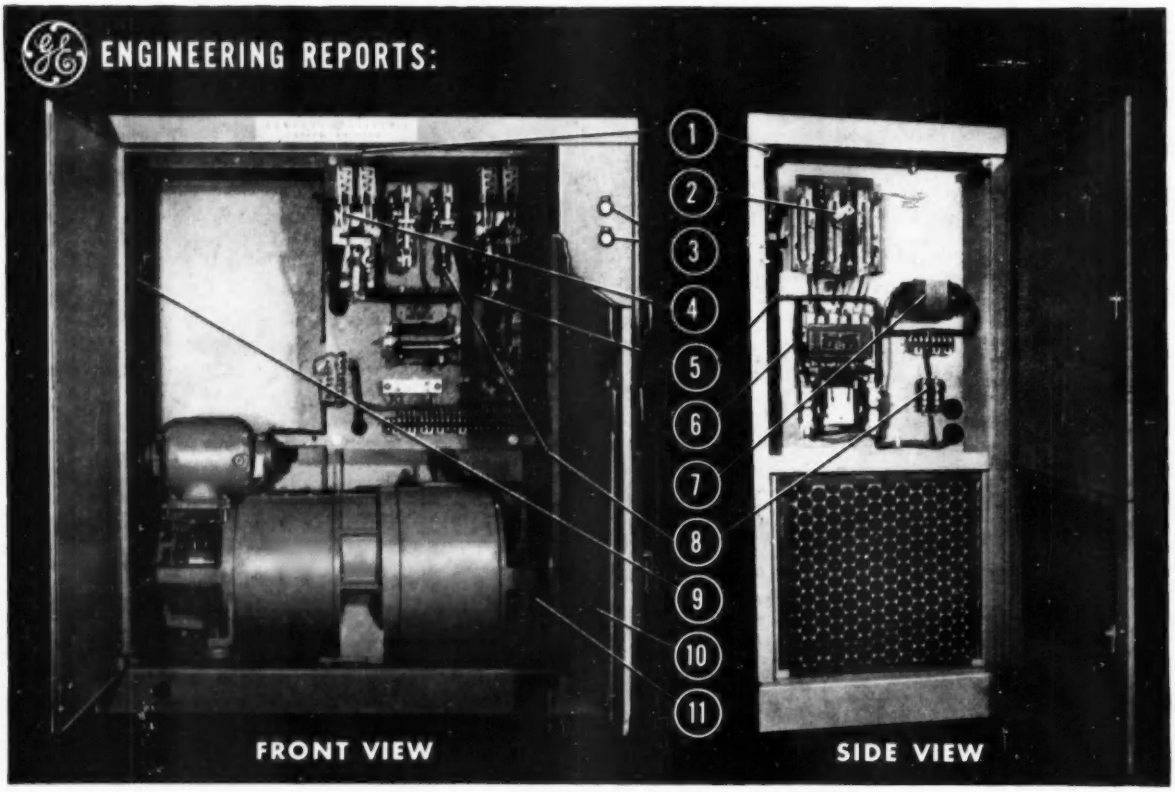


FREE CATALOG
contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.
9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois
Branch Factory: Tyrone, Pa.


Superior
TYPE 430
STAINLESS STEEL
The Heart of the Lighter
Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

ENGINEERING REPORTS:



New G-E Speed Variator drive designed to meet J.I.C. standards

Designed especially for the automotive industry, General Electric's new Speed Variator is built to meet all applicable Joint Industry Conference electrical standards. This adjustable-voltage d-c drive operating from a-c power provides precise speed adjustment of a d-c motor over a wide range. A power unit with motor-generator set and control panel, (shown above), a d-c drive motor, and an operator's control station are included in the drive. Here are some of the features of the J.I.C. model:

1. **Doors mechanically interlocked with disconnect switch . . . provides added safety for personnel**
2. **Fusible disconnect switch to isolate unit from power source**
3. **Oil-tight start-stop push-button units**
4. **Standard control components throughout**
5. **Color coded and labeled wiring**
6. **A-c undervoltage protection**
7. **110-volt control power transformer**
8. **Control circuit fusing**
9. **Metal diagram pocket inside enclosure**
10. **Hinged double doors (front and back) for easy accessibility . . . are readily removed**
11. **Pressurized cabinet excludes dust and dirt**

All devices are identified

For more information see your local General Electric Apparatus Sales representative, or write for Bulletin GEA-6000 and GEA-6127 to General Electric Co., Section 651-6, Schenectady 5, N. Y.

Engineered Electrical Systems for the Automotive Industry

GENERAL ELECTRIC

clearomatic can DOUBLE your production of drawn parts

The new Clearomatic press clutch, shown in the cutaway illustration at right, is the key to the productive efficiency of the Clearomatic press. It doesn't just speed up production, it *doubles* production as compared to conventional draw press operation. You get twice the number of cycles per minute—twice the number of drawn parts, but slide speed during the effective draw — that part of the stroke where the work is done — is actually slower than on conventional presses.



THE NEW CLEAROMATIC CLUTCH



call on C.P.C. *

Here is a specific example of the way *Clearing Productivity Consultants can help you push your manufacturing capacity far beyond what was once considered its natural limits. The new Clearomatic press is a proven fact. It has demonstrated its ability to double production in actual shop runs.

There are Clearing consultants in every field of press metalworking, ready to combine their experience with yours to help bring about greater returns in your manufacturing operation. Why not call on Clearing Machine Corporation today?

HOW IT WORKS

New bulletin on the Clearomatic press tells what it can do for you and how it operates. Your copy will be mailed without obligation.



CMC

CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION • 6497 West 65th Street Chicago 38, Illinois • HAMILTON DIVISION Hamilton, Ohio

Even the best chef samples the soup



Ever watch a good chef at work?

He doesn't trust to luck — he tastes — samples — *inspects.* He practices his own kind of process control — looking for imperfections while there's still time to correct them, without throwing away his finished product or his time!

There's an example here for many manufacturers. The *earlier* in your production that you can spot defects in parts or materials, the less it costs to salvage or scrap them — and to correct the process that causes the defects.

You might call this kind of process control "correctioneering." Usually it includes nondestructive testing methods by Magnaflux'*. For inspection by Magnaflux lets you know usefulness in advance — finds defects when and as they occur — prevents their recurrence — and avoids waste of processing time, labor and money.

This money-saving use of Magnaflux' methods is practiced by hundreds of efficiently operated companies — making everything from kitchen sinks to parts for guided missiles.

The cost?—Far less than the savings; total is usually under a penny or two per part inspected — with inspection at production speeds, when required.

Why not find out now where "correctioneering" by Magnaflux' methods can save you money — *and how much.* Ask to have a Magnaflux engineer give you the facts.

**Magnaflux is a U. S. registered trade mark of Magnaflux Corporation.*

Write for the informative booklet, "FINDING THE 'WHERE AND HOW' OF LOWER PRODUCTION COSTS." Cites examples, shows you how. FREE upon request on your company letterhead.

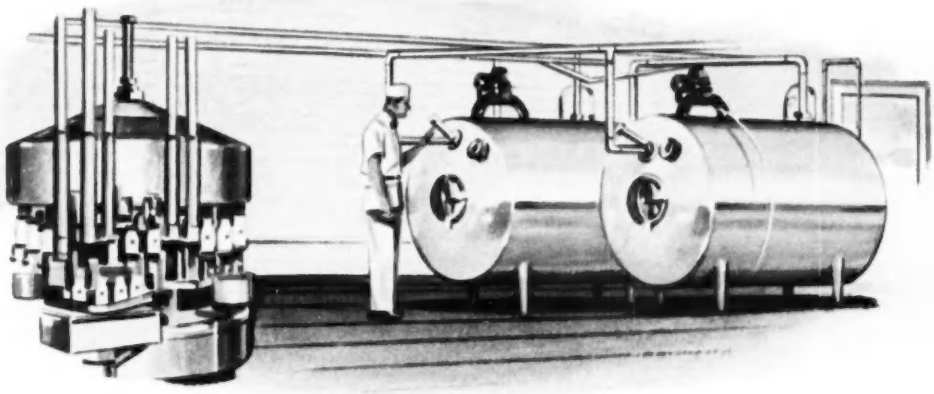


MAGNAFLUX

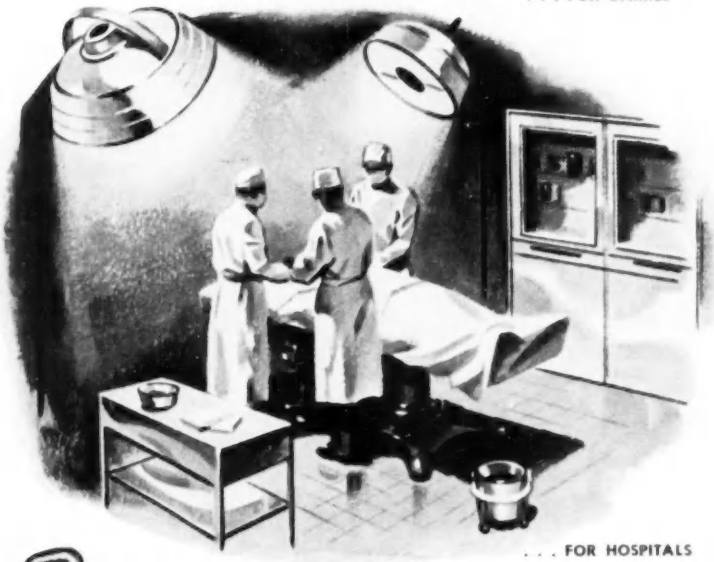
MAGNAFLUX CORPORATION

7304 West Lawrence Avenue, Chicago 31, Illinois

New York 36 • Pittsburgh 36 • Cleveland 15 • Detroit 11 • Dallas 19 • Los Angeles 58



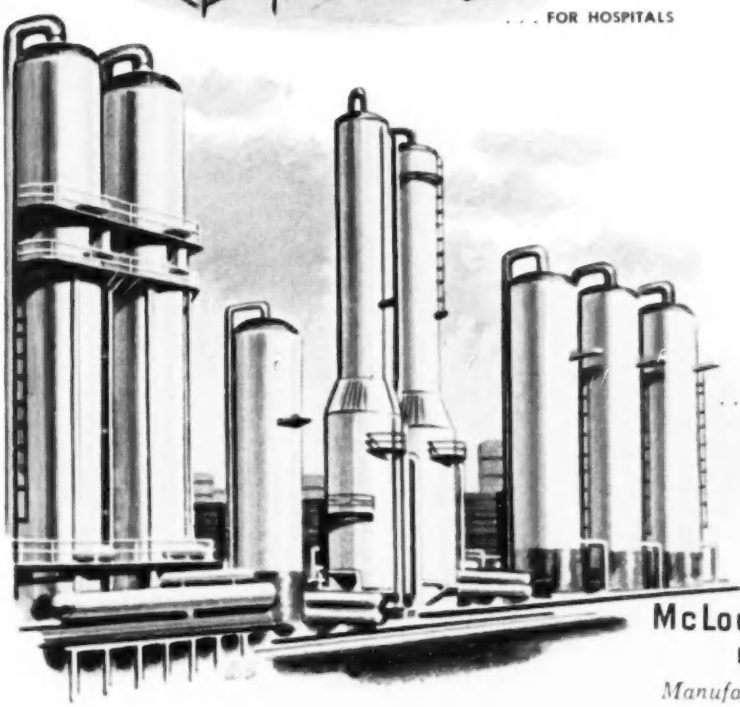
. . . FOR DAIRIES



. . . FOR HOSPITALS

McLouth STAINLESS Steel

High quality stainless sheet and strip steel . . . for the product you make today and the product you plan for tomorrow.

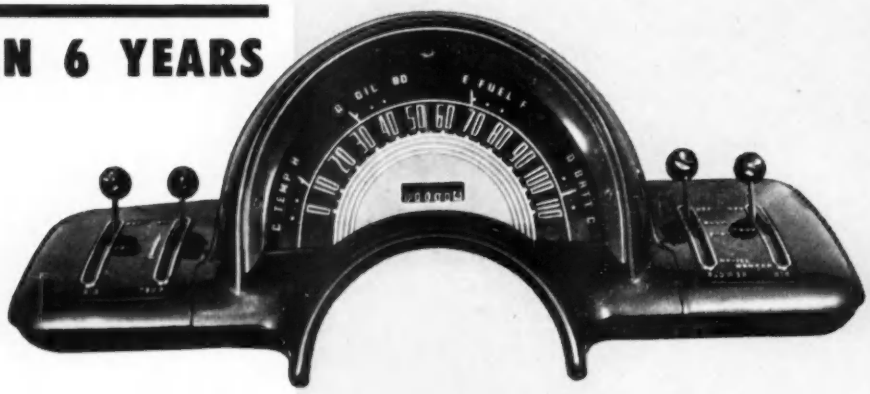


. . . FOR THE CHEMICAL INDUSTRY

McLouth Steel Corporation
DETROIT, MICHIGAN
Manufacturers of Stainless and Carbon Steels

DEMAND FOR KS SPEEDOMETER UP 160% IN 6 YEARS







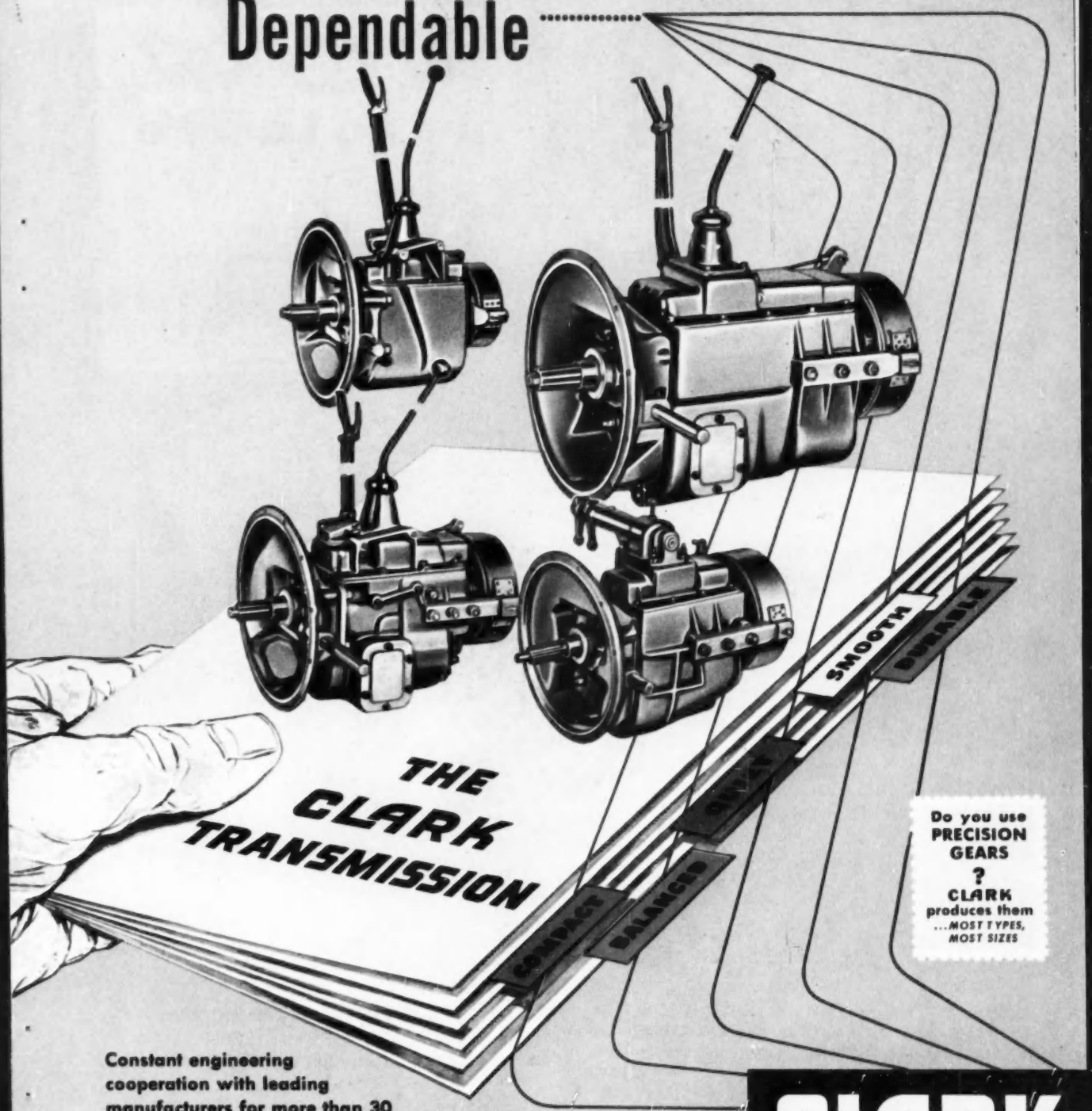
Early in 1948 King-Seeley completed the development and testing of a new speedometer design using a Cunife magnet. King-Seeley adopted this magnet material because of its inherent stability and imperviousness to shock, vibration, temperature variations and stray magnetic fields.

The general acceptance of this new design has been more than gratifying. Production has increased 160 per cent since its adoption and three new accounts have been added to the list of original equipment users.

This is the automotive industry's recognition of an instrument that has won the car owner's complete approval.

KING-SEELEY CORPORATION
ANN ARBOR, MICHIGAN
Plants at ANN ARBOR, SCIO and YPSILANTI

Dependable

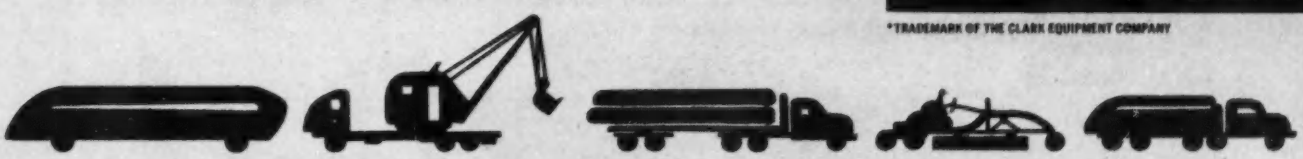


Do you use PRECISION GEARS ? CLARK produces them ...MOST TYPES, MOST SIZES

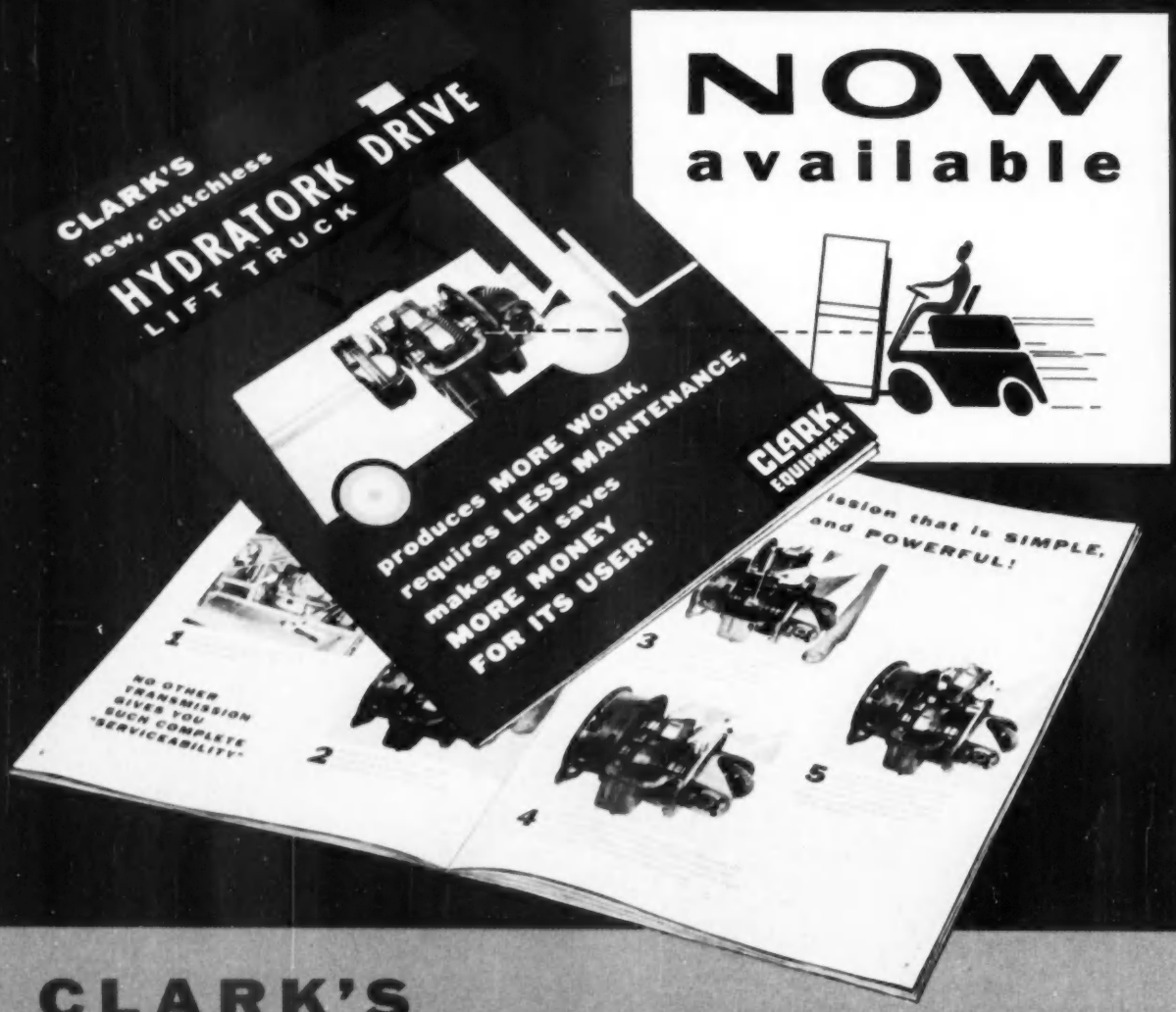
Constant engineering cooperation with leading manufacturers for more than 30 years has kept the design of Clark transmissions in pace with the ever increasing performance requirements—quietly and effectively! You, too, will find, for better transmission performance that it's "good business" to do business with Clark.

CLARK* EQUIPMENT

*TRADEMARK OF THE CLARK EQUIPMENT COMPANY



CLARK EQUIPMENT COMPANY, BUCHANAN, Battle Creek, Jackson, Benton Harbor, Michigan



CLARK'S HYDRATORK* DRIVE CARLOADER*

The revolutionary HYDRATORK DRIVE lift truck is now available in Clark's 3000-5000 lb. Carloader. The new clutchless, torque converter transmission has already won many friends among users of Clark's 6000-7000 lb. Utilitrucs. The basic benefits of this Clark-built transmission are:

1. Lower cost: no gear clash, no clutch problems, excellent serviceability.

2. More power: faster, smoother get-away, better gradability.

3. Less driver fatigue: finger-tip direction control, no clutching or shifting.

The free booklet shows detailed disassembled views of the HYDRATORK DRIVE, explains how it works. Clip the coupon to your company letterhead and we'll send it to you.

CLARK EQUIPMENT

Industrial Truck Division · CLARK EQUIPMENT COMPANY · Battle Creek, Michigan

☐ Send free HYDRATORK DRIVE booklet

Name_____ Firm_____

Address_____ City_____ Zone____ State_____

*TRADEMARK OF THE CLARK EQUIPMENT COMPANY

Prospects for Torsion Bar Suspension

(*Continued from page* 142)

spring, was anchored as shown, the lever being used as a means of adjustment for initial clearance as well as to compensate for settling.

The Firebird torsion bar, as illustrated, makes for an extremely clean and simple installation. The main objective was to fit a suspension into a limited space. Since shaft proportions could be made quite liberal, it is rather moderately stressed — maximum fiber stress being around 90,000 psi. As we understand it, the shaft was machined all over but not preset.

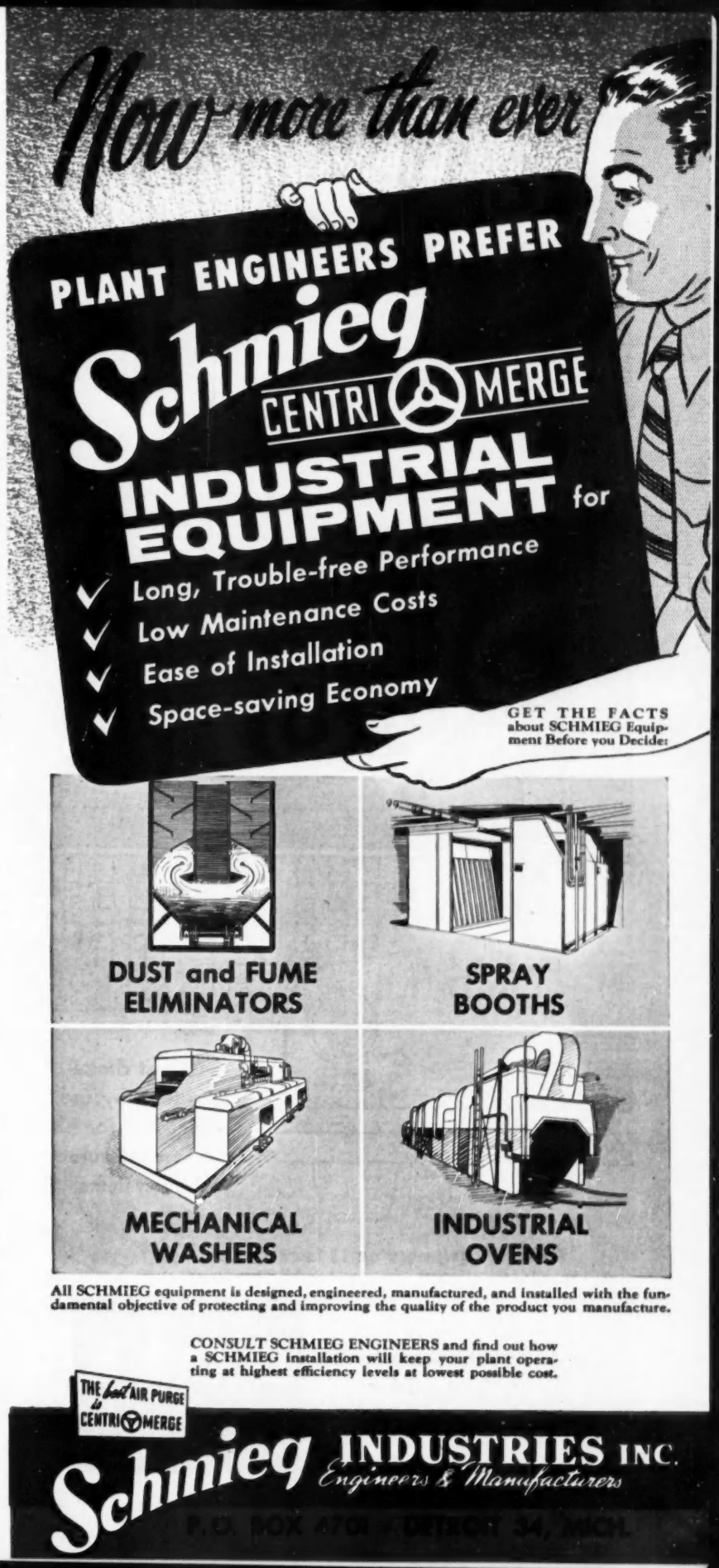
Design and production data on torsion bars is covered quite thoroughly in the SAE Manual on Torsion Bar Springs (1947 Edition). Obviously, it is desirable to make the bars as light as possible, consistent with loading and permissible maximum fiber stress.

To this end, the designer has to select optimum conditions from a variety of choices. The higher he makes design maximum fiber stress the smaller the diameter of the bar and the lighter will be the entire assembly. In the opinion of some specialists maximum stress should not exceed say 130,000 psi, although bars for military vehicles have been stressed to 140,000 psi or higher. This high range, above 100,000 psi, requires both shot peening and presetting.

There is then a question of balancing design factors with associated manufacturing problems. If maximum stress is held below 100,000 psi, it may be feasible to dispense with shot peening employ only presetting. But a lower stress range results in larger and heavier bars and larger and heavier associated mechanism.

Kaiser Set to Expand Aluminum Facilities

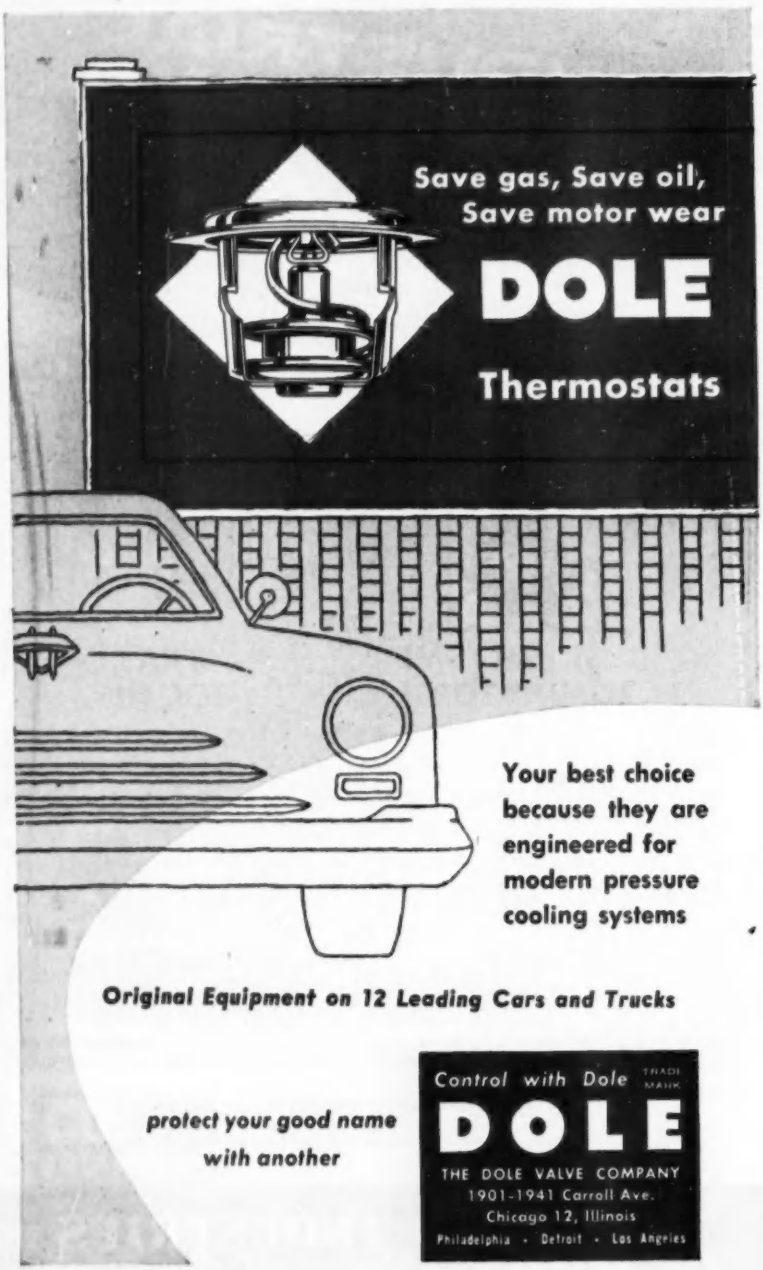
Kaiser Aluminum & Chemical Corp. has announced a $1.5 million expansion of aluminum sheet rolling and finishing facilities at its Trentwood Works in the State of Washington. Major additions will be two rolling mills, a 3000 fpm cold rolling mill for light-gage sheet, and a mill to produce wide embossed, or patterned, sheet.



ON OUR WASHINGTON WIRE



Renewed efforts are to be made to fill the gaps in stocks of Government-owned machine tools and related equipment used in defense production. Orders for this action are going out from the Office of Defense Mobilization to Federal procurement agencies.



Operations of some 300,000 manufacturing companies will be canvassed by mail next year in the new Government business census. Firms will be asked to report on payrolls, production, employment, consumption of fuel, power, materials and value added by manufacture during 1954.

•

Renegotiation of defense contracts has been extended until Jan. 1 by Congress, but on a reduced scale. All contracts valued at less than $500,000 are now exempt. Up to now, only contracts valued at less than $250,000 have been exempt from renegotiation.

•

American Iron & Steel Institute has taken over distribution of Government's defense manual for the iron and steel industries. Write AISI, 350 Fifth Ave., New York 1, N. Y., for the "Industrial Defense Planning Manual."

•

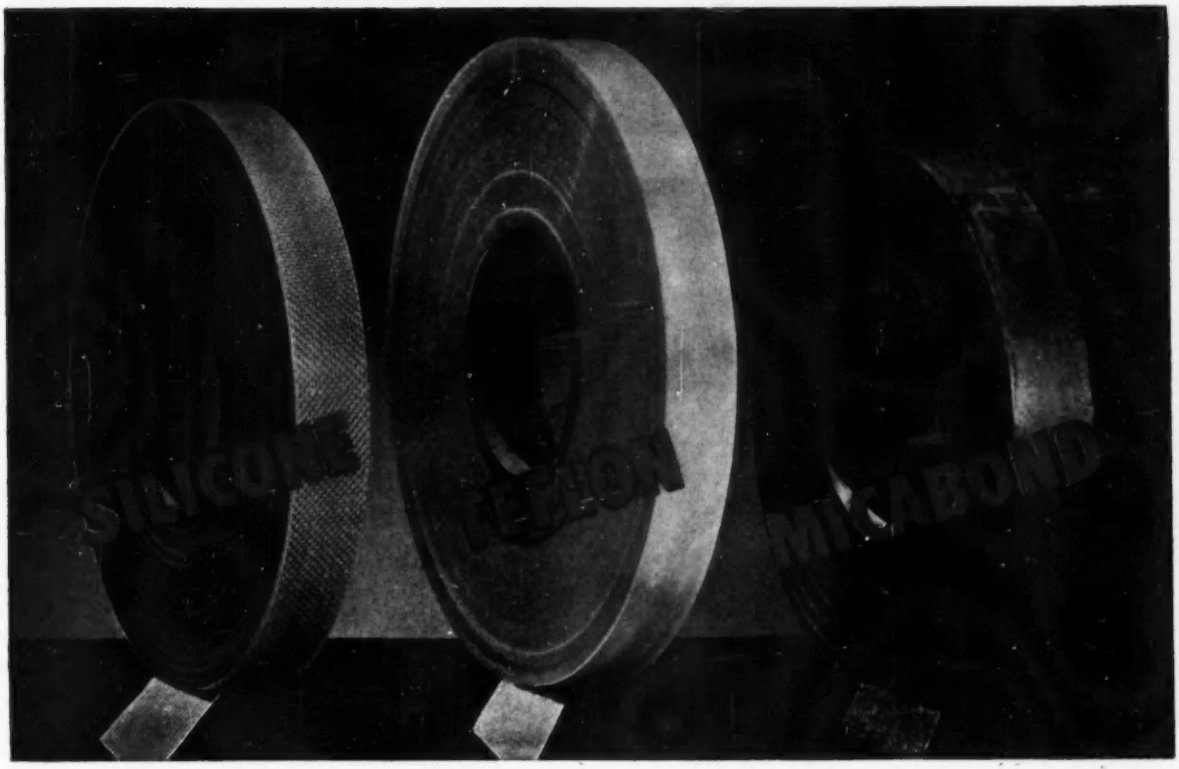
Enough aluminum will be available to U. S. users to cover wartime needs over a period of several years. Office of Defense Mobilization made this prediction recently in revealing discontinuance of the third round of aluminum production expansion, calculated to raise output by 200,000 tons a year.

•

Fringe benefit payments by U. S. employers may amount to more than $20 billion a year, U. S. Chamber of Commerce estimates. Costs for employe benefits averaged $720 per worker in 1953.

•

Small firms are to get more subcontracts from large prime contractors, under a new Government policy of spreading defense jobs. This is part of a plan for future action described by Small Business Administration.



C-D-F INSULATING TAPES

Uniform strength and quality plus prompt deliveries!

C-D-F SILICONE TAPES for A.I.E.E. Class H Electrical Insulation. Available in Varnished Fiberglas cloth and Silicone Rubber-coated Fiberglas cloth. Resistant to high temperatures; high dielectric strength, low dielectric losses, excellent moisture resistance and high tensile strength. They resist mild alkalis, non-oxidizing acids, mineral oils, oxygenated solvents. Available in a range of sizes on continuous rolls. Write for Technical Bulletin #47.

C-D-F TAPES OF TEFLON* have the desired mechanical and electrical properties for heavy-duty motor, generator, and conductor insulation. Unaffected by temperature fluctuations, exposure to oils and greases, or weather conditions. Fiberglas supported and unsupported Teflon tapes are available in a range of sizes.

*du Pont trademarks.

C-D-F MICABOND TAPES have an inherently high and permanent resistance to heat with good dielectric properties. Micabond Tapes are used for insulating motor and generator armature and field coils, turbo-generator coils, and many similar applications where flexible high quality insulation of A.I.E.E. Classes B and H insulators are required. Available in a wide range of sizes with many different backings including: fiberglas, silk, cellophane, cotton, paper, and Mylar*.

If you have an insulating problem, probably a C-D-F product is the answer. C-D-F manufactures and fabricates electrical insulation, laminated and molded plastics. Sales offices are located in principal cities. Call your C-D-F sales engineer—he's a good man to know!

THE NAME TO REMEMBER... CDF SILICONE, TEFLON, MICABOND TAPES

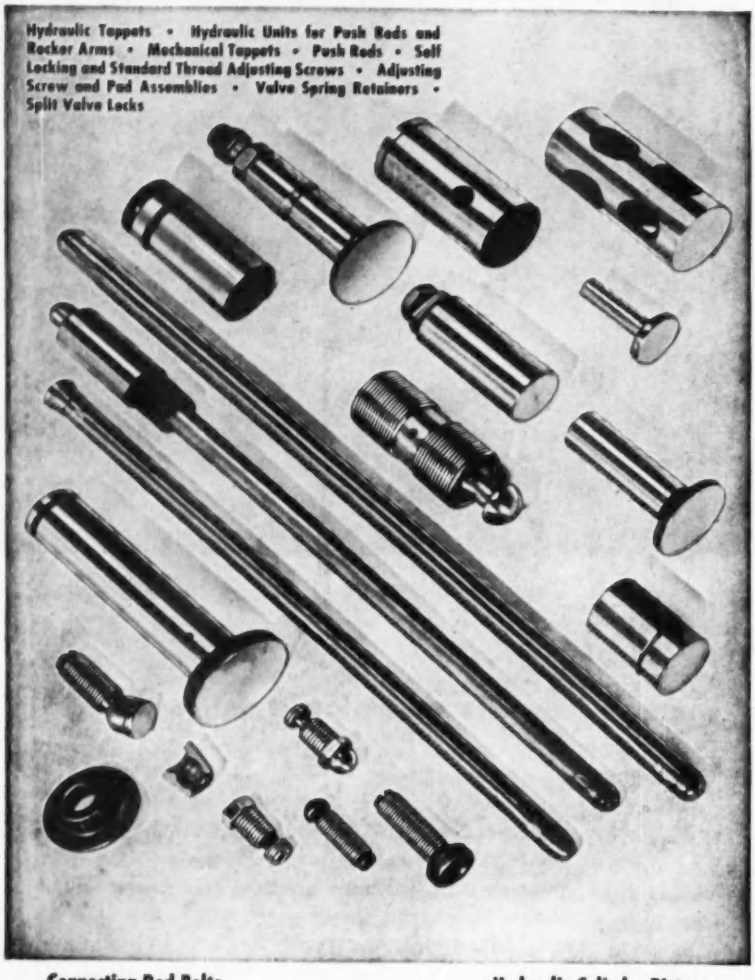
Continental-Diamond Fibre

CONTINENTAL-DIAMOND FIBRE COMPANY

NEWARK 2, DELAWARE

"CHICAGO"
precision valve gear parts

●STEEL ●CAST IRON ●STEEL and IRON



Hydraulic Tappets • Hydraulic Units for Push Rods and Rocker Arms • Mechanical Tappets • Push Rods • Self Locking and Standard Thread Adjusting Screws • Adjusting Screw and Pad Assemblies • Valve Spring Retainers • Split Valve Locks

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
Main Bearing Studs.....Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributor Shafts.....Rocker Arm Shafts
Automatic Transmission Valves.....Water Pump Shafts
Roller Followers.....Ball Joint Assemblies

External and Internal Grinding, Thread Grinding, Precision Roll Threading

Heat Treating • Carbon Restoration • Carburizing • Carbo Nitriding • Cyaniding • Hydrogen Brazing • Complete Metallurgical, Dynamometer and Testing Laboratories

Special Screw Machine Parts 1/16" to 5" Diameter • Cold Upset 3/16" to 1" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD ILLINOIS
Established 1872

More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from July 15 to August 13, 1954. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

ACF BRILL MOTORS CO., Hall Scott Div., Berkeley, Calif.
Automotive spare parts—$26,350

AIRCOOLED MOTORS, INC., Syracuse, New York
Maintenance parts—Various—$27,519

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wisconsin
Tractor, crawler-type—21 ea—$162,749
Spare parts—14 lots—$60,117

AMERICAN MACHINE AND METALS, United States Gauge Div., Sellersville, Pa.
Multi-purpose indicators—4538—$318,499
Oil transmittors—669 ea

AMGEARS, INC., Detroit, Michigan
Tank spare parts—375—$242,344

AUTOMATIC TRANSPORTATION CO., Div. of Yale & Towne Manufacturing Co., Chicago, Illinois
Trucks, lift, electric—13—$26,662
Trucks, low lift, electric—14—$31,642

AVCO MANUFACTURING CORP., Crosley Div., Cincinnati, Ohio
Facilities—$300,000

AVCO MANUFACTURING CORP., Lycoming Div., Stratford, Conn.
Engines, spare parts, special tools—159 ea—$5,333,950
Spare parts—$519,810

B. & T. ENGINEERING & SALES CO., Detroit, Mich.
Diecasting machine—7—$187,233

THE BAKER-LULL CORP., Minneapolis, Minn.
Planetary axle assemblies, red blinder light assembly—232—$316,659
Trucks, fork, Diesel, with spare parts—93—$949,871

THE BAKER-RAULANG COMPANY, Cleveland, Ohio
Trucks, fork, gas, spare parts kits—56—$80,991
Trucks, fork, electric—12—$47,366

BEECH AIRCRAFT CORP., Wichita, Kansas
Blade assys—264 ea—$81,253
Generator set—570 ea—$5,417,854

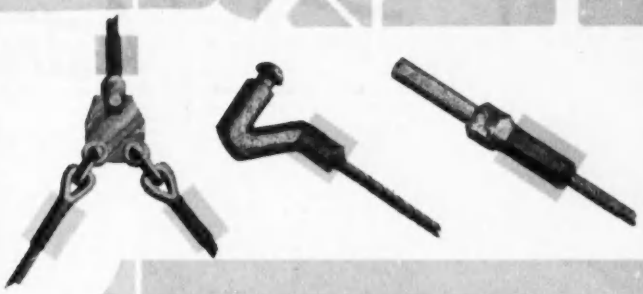
BELL AIRCRAFT CORP., Fort Worth, Texas
Spare parts—$361,318

BENDIX AVIATION CORP., Bendix Products Div., South Bend, Indiana
Wheel assy—1325—$1,320,321
Shaft and valve assy—Various—$75,662
Fuel control parts—Various—$43,168

BENDIX AVIATION CORP., Bendix Products Div., Hamilton, Ohio
Modification fuel controls—250 ea—$300,000

(*Turn to page* 158, *please*)

New **SAVINGS** *now possible in cables and assemblies...*



Bergen's improved swaging process allows full strength ratings...cuts rejects

Bergen's new hydroformer molds fitting shafts around cables by rotary pressure with minimum disturbance of the grain structure. Internal stresses and fatigue cracks are greatly reduced in comparison to conventional swaging methods. Fittings are always in perfect alignment which develops the full rated strength of cables and reduces the number of rejects.
Bergen cables, assemblies and slings have met the most exacting requirements of automotive and aircraft manufacturers for many years. Millions of hours in service under every possible operating condition prove their dependability.

For maximum strength and dependability specify **BERGEN**

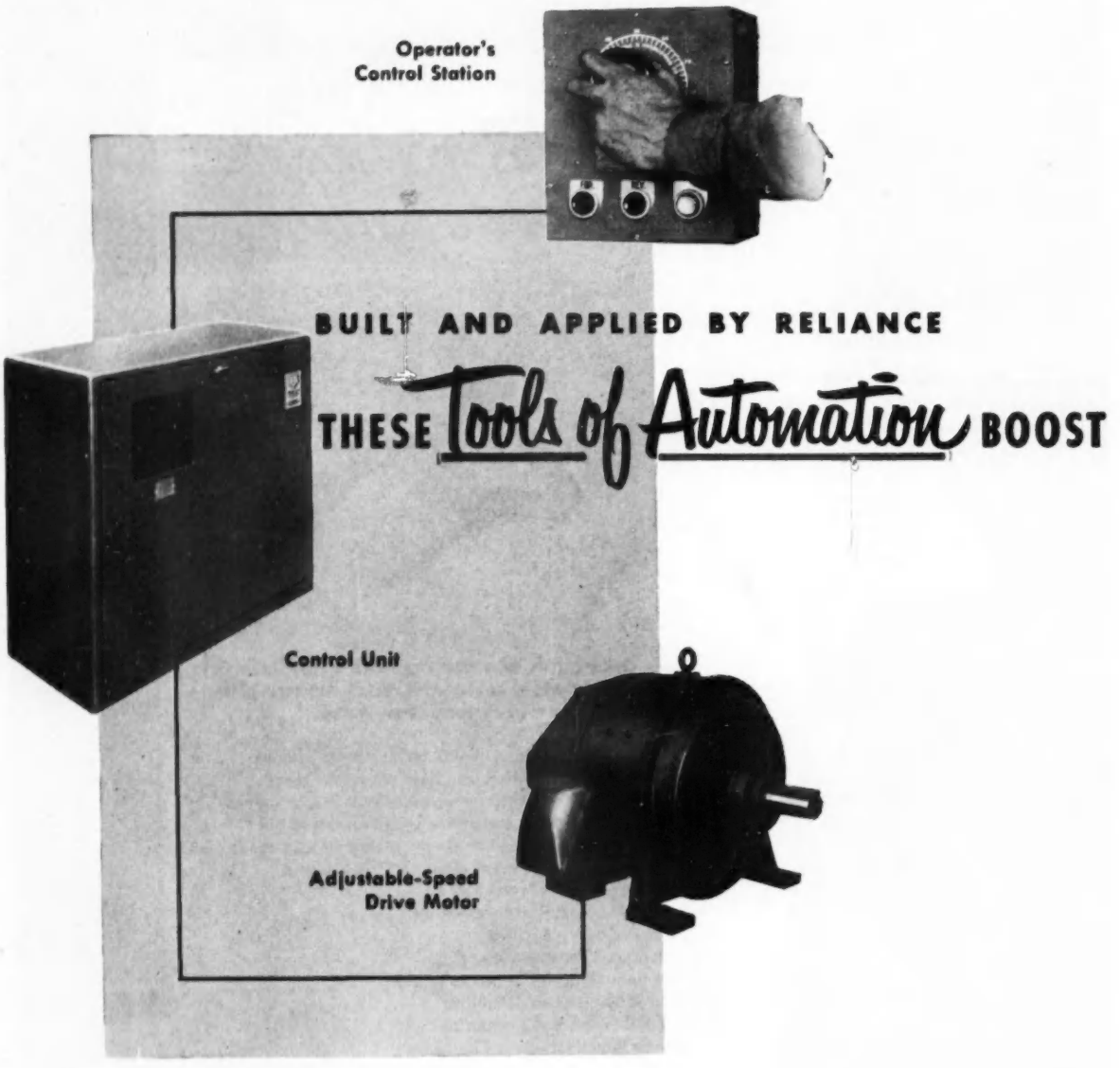


AUTOMOTIVE DIVISION

BERGEN

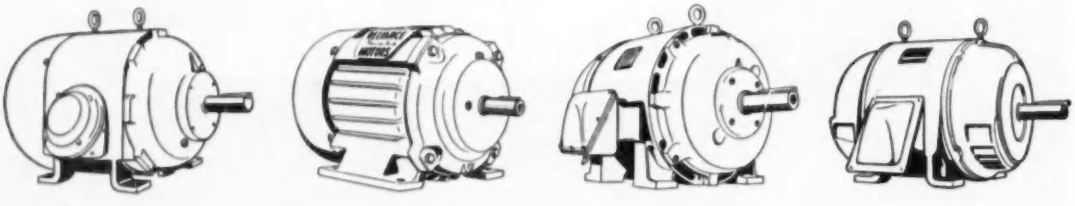
WIRE ROPE COMPANY 32 GREGG STREET, LODI, NEW JERSEY

Send today for Bergen's "Guide to Selecting Wire Rope"



BUILT AND APPLIED BY RELIANCE

THESE *Tools of Automation* BOOST



RELIANCE ELECTRIC AND ENGINEERING CO.

1123 Ivanhoe Road, Cleveland 10, Ohio • *Sales Representatives in Principal Cities*

RELIANCE V★S DRIVE®

RELIANCE Precision-Built MOTORS

PRODUCTION EFFICIENCY IN EVERY INDUSTRY

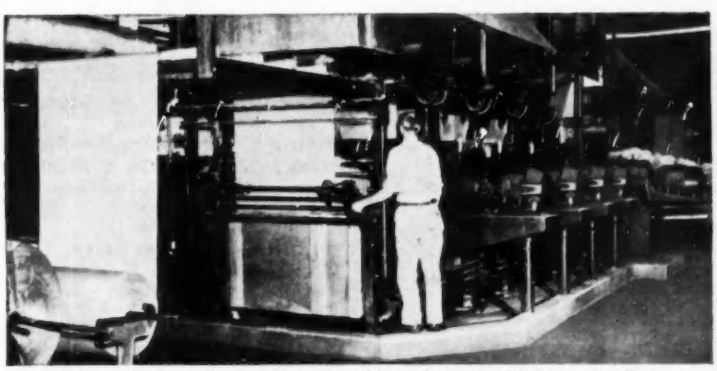
. . . Moving Everything from Textiles to Engine Blocks

at less cost

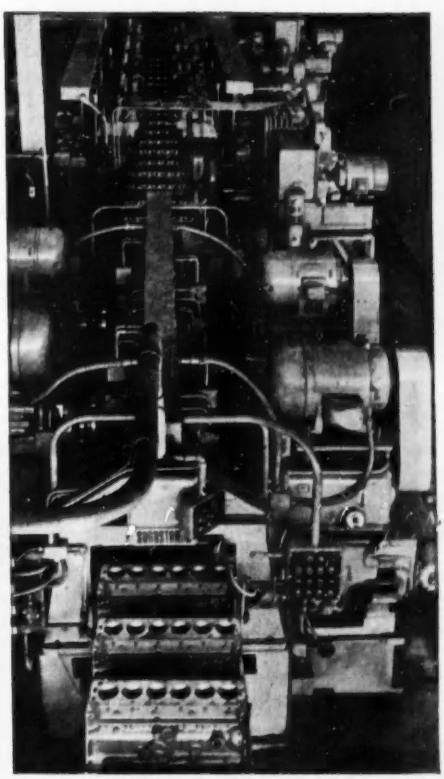
If you're looking around for ways to improve your profit ratio—then take a look at these Tools of Automation! They include Reliance motors, adjustable-speed drives, electronic controls, and applied engineering. They've made a lot of companies a lot more competitive.

They are used in the world's largest and most completely automated engine plant. And you will find them delivering outstanding performance on machinery in paper, steel, machine tool, textile—in fact, in every industry.

The nearly 50 years of practical, first-hand experience Reliance has in developing, building and applying the Tools of Automation are available to help you automate a single machine . . . a process . . . or a complete production line. For all the facts, write for our new booklet, "The Tools of Automation". A-1485



Efficiency of this textile range is increased by multi-motored Reliance V★S Drive.



Over 2,000 Reliance Precision-Built Motors deliver steady, unfailing power to speed engine castings automatically through 26 machine operations.

More Defense Contract Awards

(*Continued from page* 154)

BENDIX AVIATION CORP., Bendix Radio Div., Towson, Maryland
Radio receiver, transmission, mountings, control panel and data—$3,078,071

BENDIX AVIATION CORP., Eclipse Pioneer Div., Teterboro, New Jersey
Speed indicator—135 ea—$53,695
Transmitters—1174—$148,767
Generators—419—$293,635
Parts for oxygen regulators and indicators—Various—$48,080

BENDIX AVIATION CORP., Pacific Div., North Hollywood, California
Spare parts for A/C strut assys—each—$33,709
Hydraulic valve assy—Various—$77,830

BENDIX AVIATION CORP., Red Bank Div., Eatontown, New Jersey
Alternator, exciter, control, regulator panel—Various—$187,749
Control panel—314 ea—$52,727

ASSEMBLE MOULDINGS *Fast*

...without "dimpling" or damaging parts



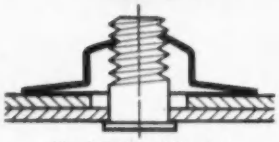


Fig. 1 Before tightening

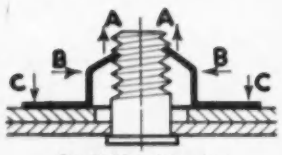


Fig. 2 After tightening

PALNUT spring steel locking action "cushions" high-tightening torque

● Note in Fig. 1, how the spring washer base is arched before tightening. It has strong spring tension to pull up parts tightly, yet is resilient enough to prevent stud breakage or damage to moulding. When tightened (Fig. 2) the washer base is flattened, causing spring forces A-A and B-B to be exerted inward and upward on the stud threads and downward on the assembled parts. This live spring action resists loosening under vibration.

WASHER TYPE
PALNUT
TRADE MARK
LOCK NUTS

Also get these advantages on
Deck Handles
Tail and Parking Lights
Hood Ornaments and Nameplates
Instrument Mountings

Handle ONE part instead of THREE



Washer Type PALNUTS do the job of an ordinary nut, lockwasher and plain washer, at much lower cost. Assembly operation is reduced to one part. Ideally adapted to high speed application with standard power tools. Washer base spans slots and holes. Available in all popular sizes. State sizes required for free samples.

THE PALNUT COMPANY
60 Cordier St., Irvington 11, N. J.
Detroit office and warehouse:
730 West Eight Mile Road

BENDIX AVIATION CORP., Scintilla Div., Sidney, New York
Vehicle parts—7,624,693—$420,994

BOEING AIRPLANE CO., Seattle, Washington
Model 502-9A, gas turbine engine—$44,917
Bomber kits—131 ea—$132,772
Facilities—$11,797
Mobile trainer—$714,194

BORG-WARNER CORP., Ingersoll Products Div., Kalamazoo, Mich.
LVTP-5 power transmission—1—$846,938
Services for LVTP-5 and LVTP-6 (518-208)—$407,498

BORG-WARNER CORP., Pesco Products Div., Bedford, Ohio
Pump assys—Various—$191,572
Parts for P&W J57 engines—Various—$77,294

BREEZE CORP., INC., Union New Jersey
Vehicle parts—1,434,090—$53,093

BROWN & SHARPE MANUFACTURING, Providence, Rhode Island
Automatic screw machine with standard equipment—61—$407,580

THE BUDA COMPANY, Harvey, Illinois
Spare parts—9 lots—$170,459

CANADIAN COMMERCIAL CORP., Ottawa, Ontario, Canada
Airplanes, spare parts, special tools—$1,785,172

CHANCE VOUGHT AIRCRAFT, INC., Dallas, Texas
Maintenance parts—Various—$58,706

CHECKER CAB MANUFACTURING CO., Kalamazoo, Michigan
Chassis, trailer 1½T, two wheel—400—$252,312

CHRYSLER CORP., Detroit, Michigan
Studies of 90 MM gun and tank—$40,000
Maintenance, protection and preservation of Government owned facilities—$5,027,767
Auto spare parts—39,728—$50,174
Tanks, T48, spare parts; tanks T-43, spare parts—$4,769,527

CINCINNATI MILLING AND GRINDING MACHINES, INC., Cincinnati, Ohio
Machine, grinding, with motor and machine, milling with motor—2 ea—$38,471

CLARK EQUIPMENT CO., Battle Creek, Michigan
Yard lifts—54—$92,498
Trucks, fork, electric—29—$158,037

CLARK EQUIPMENT CO., Buchanan, Michigan
Trucks, fork lift—19—$74,983
Trucks, fork, gas spare part kits—156—$249,424
Trucks, fork, electric—6—$26,966

CLAYTON MANUFACTURING CO., El Monte, Calif.
Seven dynamometers—$149,458

CONE AUTOMATIC MACHINE CO., INC., Windsor, Vermont
Automatic screw machine—16—$547,356

CONTINENTAL AVIATION & ENGINEERING CORP., Detroit, Michigan
Engines—49—$1,856,546
Engne parts—3932—$180,751

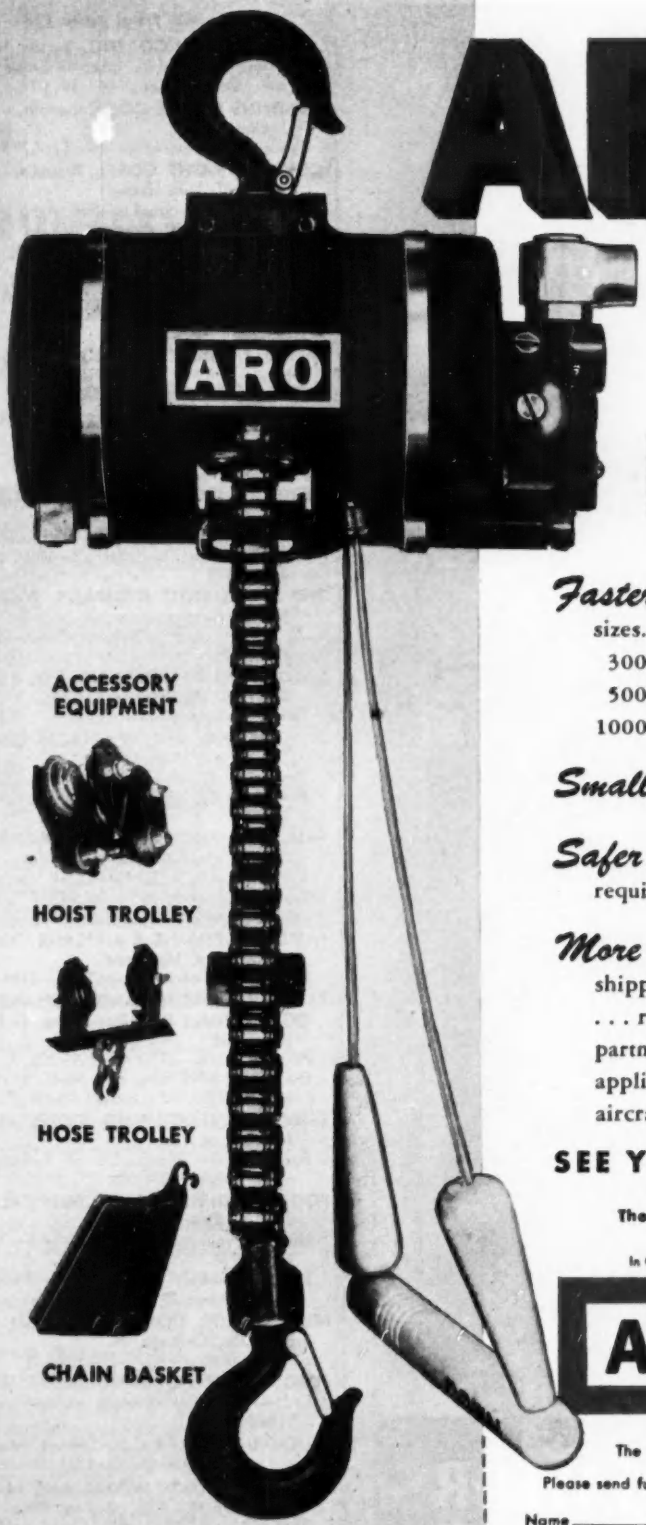
CONTINENTAL MOTORS CORP., Muskegon, Michigan
Packette engines data—854—$2,761,060
Engine spare parts—6451—$147,131

CONTINENTAL MOTORS CORP., Detroit, Michigan
Spare parts AVI-1790 engine—Job—$28,020

(*Turn to page* 160, *please*)

ARO

VARIABLE SPEED AIR HOIST



ACCESSORY EQUIPMENT

HOIST TROLLEY

HOSE TROLLEY

CHAIN BASKET

Faster... Quieter... wide speed range, 3 sizes.

300 lb.—lift rate 75 ft. per min.
500 lb.—60 ft. per min.
1000 lb.—40 ft. per min.

Smaller... one man can easily install.

Safer... no spark hazard . . . betters all safety requirements.

More Useful... saves time and labor for shipping docks . . . heat treating departments . . . refineries, chemical plants and plating departments . . . machine shops and foundries . . . appliance, furniture, textile, automobile and aircraft assembly lines . . . stock rooms.

SEE YOUR ARO DISTRIBUTOR

The Aro Equipment Corporation, Bryan, Ohio
Offices in All Principal Cities
In Canada—Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO AIR HOIST
Also . . . Air Tools . . . Lubricating Equipment . . . Aircraft Products . . . Grease Fittings

The Aro Equipment Corporation, Bryan, Ohio

Please send full details on the new ARO Air Hoist, without obligation.

Name _____

Company _____

Street _____

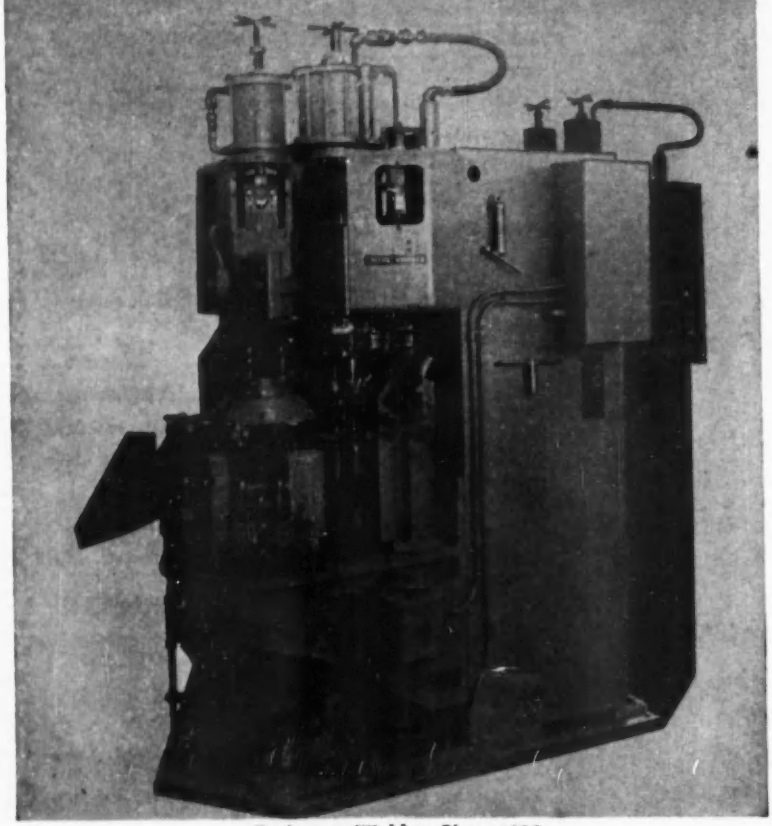
City _____ State _____

"Let's call in T.W."

"THEIR EXPERIENCE WITH AUTOMATION OF RESISTANCE WELDERS WILL COME IN HANDY ON THIS ONE"

● "What's the best method for automatically loading and unloading resistance welders?" . . . "Can the welders be made an integral part of the production line?" . . . "What mechanical devices can be employed to make resistance welders automatic?"

Automatic resistance welding may be the production key you have been seeking to improve your costs. By calling in T-W you will gain the benefit of their work with automation as applied to resistance welding. One recommendation by T-W application men may make the big difference in your costs. T-W has the facilities, the engineers and the reputation for the best in resistance welding.



Resistance Welders Since 1898

Sales and Service

CHARLOTTE • CHATTANOOGA
CHICAGO • CLEVELAND • DALLAS
DAYTON • DENVER • DETROIT
LOS ANGELES • PHILADELPHIA
PORTLAND, OREGON • SEATTLE
ST. LOUIS • STAMFORD • WASHINGTON
OAKVILLE AND WINDSOR, ONTARIO

TAYLOR-WINFIELD
RESISTANCE WELDERS

THE TAYLOR-WINFIELD CORPORATION WARREN, OHIO

(*Continued from page* 158)

J. C. CORRIGAN CO., INC., Boston, Mass.
Conveyors, portable, gasoline engine driven, electric motor—4—$41,077

CUMMINS ENGINE CO., Columbus, Indiana
Diesel generator units—14—$167,273

CURTISS-WRIGHT CORP., Propeller Div., Caldwell, New Jersey
Prop assys—8 ea—$110,536

CURTISS-WRIGHT CORP., Wright Aeronautical Div., Wood-Ridge, N. J.
Engineering changes, spare parts—$143,700

DANA CORP., Toledo, Ohio
Parts—638—$46,323

DELCO PRODUCTS DIVISION, Dayton, Ohio
Spare parts—3 lots—$46,552

DOUGLAS AIRCRAFT CO., INC., Long Beach, Calif.
Facilities—$5,253,133
Aircraft, spares—$11,523,683

DOUGLAS AIRCRAFT CO., Tulsa Division, Tulsa, Oklahoma
Miscellaneous kits and planning for IRAN maintenance of aircraft—286 ea—$2,577,828

THE J. H. ELLIOTT COMPANY, Washington, D. C.
Jig boring and milling machines—10—$254,018

EMHART MANUFACTURING CO., Henry & Wright Div., Hartford, Conn.
Dieing machine—6—$104,787

ENGINEERING AND RESEARCH CORP., Hyattsville, Maryland
Simulators—7 ea—$3,856,000
Power supply, gear box assy.—Various—$25,350

FAIRCHILD ENGINE AND AIRPLANE CORP., Guided Missiles Division, Wyandanch, L. I., New York
Repair and modification of PET REL missiles—$160,000

FAIRCHILD ENGINE & AIRPLANE CORP., Hagerstown, Maryland
Replacement of hinges—67 ea—$144,499

FAIRCHILD ENGINE AND AIRPLANE CORP., Stratos Div., Bay Shore, L. I.,—New York
Aircraft parts—39 itms—$159,306
Generator drive assy. and repair parts—69 ea—$120,242

FENN MANUFACTURING CORP., Hartford, Conn.
Facilities for production of helicopter rotor heads—$361,000

FOOD MACHINERY AND CHEMICAL CORP., Riverside, Calif.
Landing vehicles tracked, LVTP-5—74—$7,806,778
Six pilot models of the Cargo Tractor, Prime Mover T85—$1,062,282

FORD MOTOR COMPANY, Aircraft Engine Div., Chicago, Ill.
Aircraft engines—403—$92,598,272

FORD MOTOR COMPANY, Detroit, Mich.
RAD—Continuity of truck, utility—$245,000

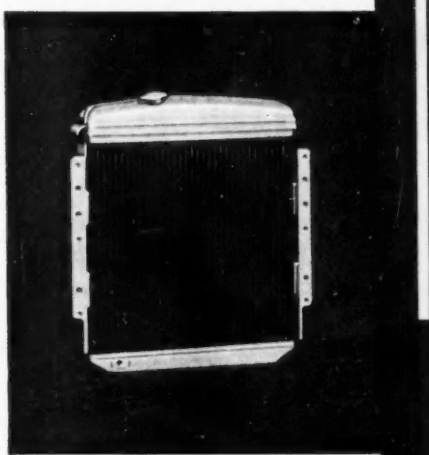
FRUEHAUF TRAILER CO., Detroit, Mich.
Auto spare parts—2016—$141,056

THE GALION IRON WORKS AND MANUFACTURING CO., Galion, Ohio
Grader, road, DED, model 118 w/GM model 4057C, 4-71 Diesel engine—66 ea—$615,978

GAR WOOD INDUSTRIES, INC., Wayne, Michigan
Auto spare parts—11,701—$28,435

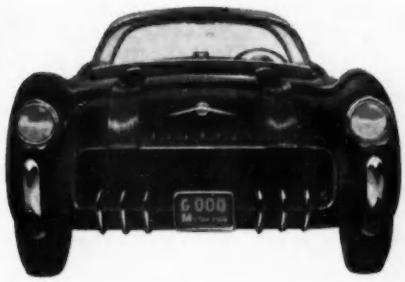
(*Turn to page* 162, *please*)

Cars of tomorrow... Harrison cooled!

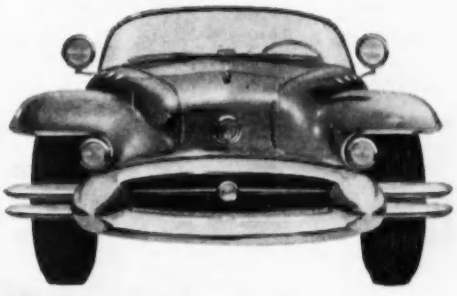


New ideas on wheels! And Harrison is keeping pace with these low, super-streamlined General Motors "dream cars". Behind each beautiful grille is a Harrison radiator . . . specially designed to cool the high-performance, high-powered engine. And no one is better equipped to design radiators for the cars of tomorrow than Harrison . . . leader in cooling the *cars of today*. For Harrison has the facilities . . . research, manufacturing, engineering! And Harrison has the *experience* . . . experience gained in the production of more than 57,000,000 radiators for cars, trucks and buses. If you have a cooling problem, look to Harrison for the answer!

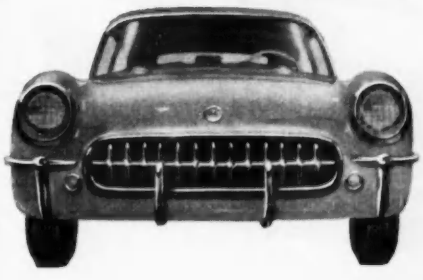
TEMPERATURES MADE TO ORDER



BONNEVILLE . . . Low, sleek Pontiac features a plexiglass canopy over the driver compartment.



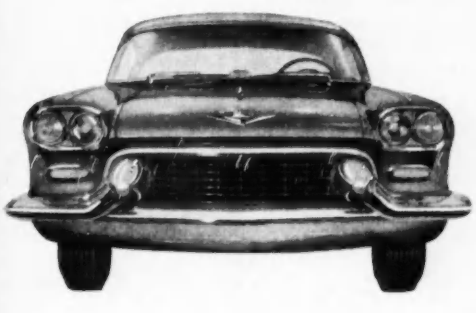
WILDCAT II . . . Sports convertible by Buick features "flying wing" front fenders.



CORVAIR . . . Exciting sports coupe by Chevrolet with "fast back" styling.



CUTLASS . . . Dynamo on wheels by Oldsmobile, with 250-h.p. "Rocket" Engine.



EL CAMINO . . . "Aircraft styling" gives Cadillac's "dream car" a rakish look of the future.

HARRISON

RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

(*Continued from page* 160)

GEAR GRINDING MECHANICAL CO., Detroit, Mich.
Auto spare parts—2471—$80,183

GENERAL DYNAMICS CORP., Convair Div., San Diego, California
Aircraft, spare parts, special tools and GHE—21 ea—$13,382,790

GENERAL MOTORS CORP., Allison Div., Indianapolis, Ind.
XT-1400 transmission—$453,690
Overhaul of engines—3 itm—$4,315,400
Overhaul of turbo jet engines—840—$4,315,400
Extension of contracts—Not applicable—$705,040
Turbo-jet engines—721—$40,001,800
Turbo-jet engines, special tools—201 ea—$4,668,200

GENERAL MOTORS CORP., Allison Div.—Aeroproducts Operation, Dayton, Ohio
Propeller assys—479—$9,074,967

GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Michigan
Eight ¾ ton pickup trucks and twelve ½ ton pickup trucks—$23,284

GENERAL MOTORS CORP., Fisher Body Div., Detroit, Michigan
Tank, 90 MM gun, T-48—4352—$18,838,806

GENERAL MOTORS CORP., Pontiac Motor Div., Pontiac, Michigan
Track section for carrier, cargo T46E1—535 ea—$107,379
Metal part for rocket 4.5"—136,000—$2,448,000

GENERAL MOTORS CORP., GMC Truck & Coach Div., Pontiac, Mich.
Commercial vehicles—30—$85,880
Transmission assy.—273,600—$317,558
Auto spare parts—574,564—$890,970

GENERAL MOTORS CORP., United Motors Service Div., Detroit, Mich.
Auto spare parts—10,045—$(2,350

FRED S. GICHNER IRON WORKS, INC., Washington, D. C.
Trucks, crash—130—$793,883

THE B. F. GOODRICH CO., Dayton, Ohio
Spare parts for A/C wheels and brakes—$80,932

GOODYEAR AIRCRAFT CORP., Akron, Ohio
Computer, electronic analog—2 ea—$37,200

THE GOODYEAR TIRE & RUBBER CO., Akron, Ohio
Spare parts for A/C wheels and brakes—$332,401
Wheel assys—687—$1,571,719
Brake assys—578
Brake assys—1304 ea—$116,212

HENSEL GREEN & CO., Chicago, Ill.
Tractors, gasoline, Unitow 120 MH—60—$291,000

GREER HYDRAULICS, INC., Brooklyn, New York
Test stand, heater—Various—$192,125

GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, Long Island, N. Y.
Maintenance parts—Various—$208,127

HANSON-WHITNEY CO., Div. The Whitney Chain Co., Hartford, Conn.
Milling machines, thread—34—$408,476

THE HEALD MACHINE CO., Worcester, Mass.
Grinding machines—6—$148,002

HIGH PRECISION PRODUCTS CO., Westfield, New Jersey
Grinding machines—5—$466,027

HIGHWAY TRAILER CO., Edgerton, Wisconsin
Tactical vehicles—343—$369,692

HILLER HELICOPTERS, Palo Alto, Calif.
Aircraft parts—Various—$37,907
Maintenance parts—Various—$29,976
Kits—Various—$125,848

THE FRANK G. HOUGH CO., Libertyville, Ill.
Tractors, four wheel drive aircraft—180—1 lot—$1,326,900
Tractors, carrier plane, towing, Diesel—85—$366,052

INTERNATIONAL HARVESTER CO., Evansville, Ind.
Facilities for production of rifles MI Cal. .30—$422,142

JACK AND HEINTZ, INC., Cleveland, Ohio
Generators—269—$108,129
Starters—217—$65,472

JACOBS AIRCRAFT ENGINE CO., Pottstown, Pa.
Aircraft parts—31 itms—$134,737

JONES & LAMSON MACHINE CO., Springfield, Vermont
Grinder, thread—1—$286,190

KEARNEY & TRECKER CORP., Milwaukee, Wisc.
Milling machine—3—$83,047

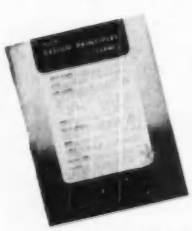
KENT-OWENS MACHINE COMPANY, Toledo, Ohio
Milling and grinding machines—1110—$358,443

(*Turn to page* 164, *please*)

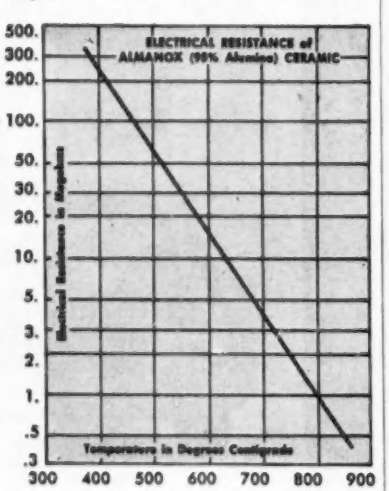
how DIELECTRIC are ENGINEERED CERAMICS?

If it's a question of building better insulation characteristics into your product, take a look at Frenchtown Engineered Ceramics. The alumina bodies, particularly, offer excellent electrical resistance at high temperatures. Take, for instance Frenchtown ALAMNOX charted below:

High dielectric strength is only one of the many desirable properties. Low thermal expansion, good thermal conductivity, excellent mechanical strength and wear resistance have enabled many manufacturers to improve over-all performance of their products.



For complete information, send for this bulletin on Design Principles and chart of electrical and mechanical properties of FRENCHTOWN ENGINEERED CERAMICS.

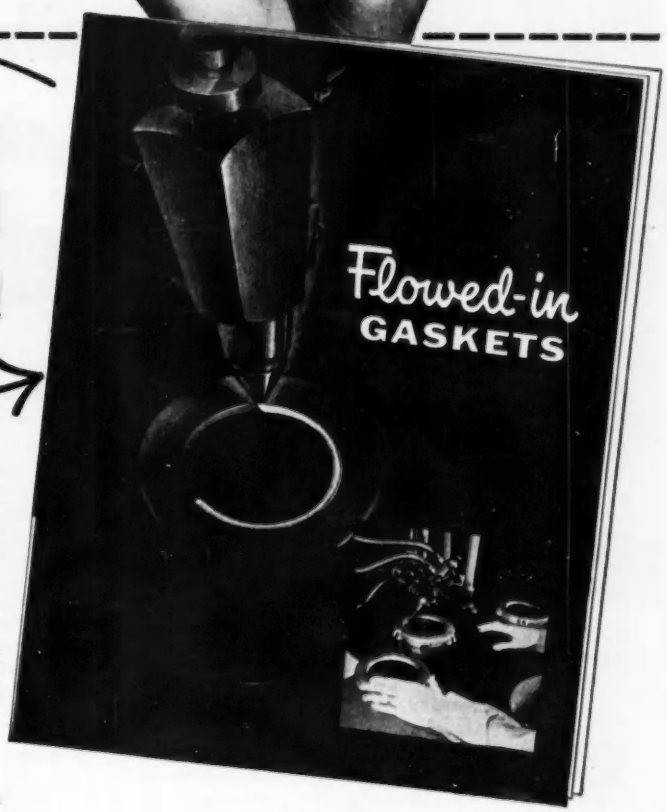


Frenchtown
PORCELAIN COMPANY
81 MUIRHEAD AVE. . . TRENTON 9, N. J.



For gasketed parts like these . . .

This FREE BOOK CAN HELP YOU CUT COSTS!



There's something new in this year's cars . . .

IT'S THE DAREX Flowed-in GASKET PROCESS!

And this fact-filled brochure gives you the whole Flowed-in Gasket Story. Here are a few samples of the things you'll read in this informative new book:

ABOUT COSTS

Using the DAREX Flowed-in Gasket Process, a major manufacturer is saving $50,000 per year in labor and materials on a single gasketing operation. As a result of this striking cost reduction, the firm has recommended the DAREX Process for several more gasketing operations.

ABOUT THE PROCESS

The Flowed-in Gasket Process is a new application of a method of sealing developed by Dewey and Almy researchers over 30 years ago, and successfully used in food container manufacture ever since.

The DAREX Flowed-in Gasket Process is more than a sealing compound . . . more than a machine . . . more than an engineering service . . . *it's a complete Process!* So when you switch to Flowed-in Gaskets, you get all three.

Compounds— Over 800 formulations available to meet most needs. Or Dewey and Almy chemists will develop a "job-tailored" compound for you.

Machines— To apply the compound, Dewey and Almy designs and builds machines based on more than 30 years' field experience.

Service— Every machine is precisely adjusted to your specifications before it leaves the shop. When it arrives, a Dewey and Almy Engineer is on hand to install and adjust the machine. Then he trains your operators to full proficiency. And whenever you need him, the Dewey and Almy Man is at your service.

DEWEY and ALMY
Chemical Company
Cambridge 40, Mass.

Offices or subsidiaries in Buenos Aires, Chicago, Copenhagen, London, Melbourne, Milan, Montevideo, Montreal, Naples, Paris, San Leandro (Calif.), Sao Paulo, Tokyo.

Discover what DAREX "Flowed-in" GASKETS can do for YOU

MAIL THE COUPON TODAY!

DEWEY and ALMY Chemical Company
Dept. A-9
Cambridge 40, Mass.

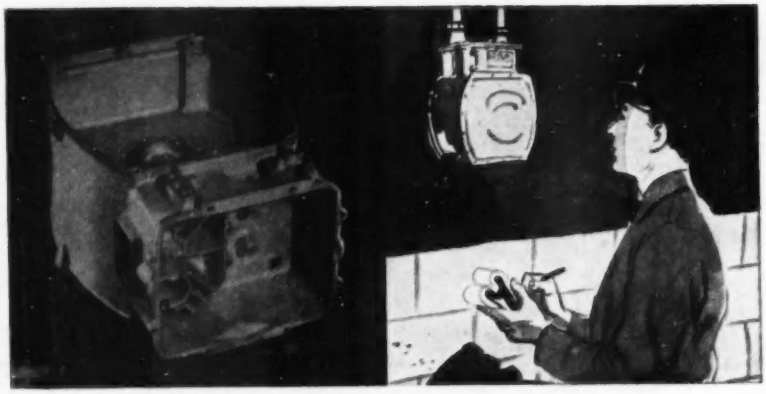
Please send me the new DAREX Flowed-in GASKET Book.

Name.....

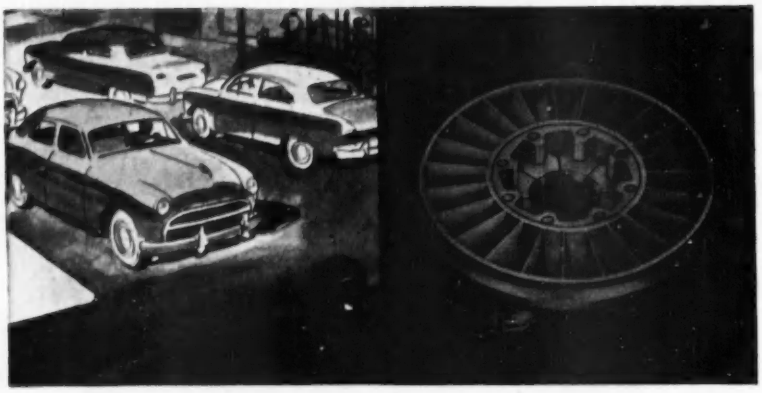
Firm.....

Street.....

City.....State.....



The Meter Reader and the Motorist



Thompson Precision-Engineers Light Metal Castings for All Industry

THE meter reader checking on gas consumption and the motorist patiently waiting for traffic to move have one thing in common — both can count on Thompson Products. The meter reader's dials and the motorist's automobile are each improved by Thompson's versatile Light Metals Division.

In the case of the meter reader, it's the housing in which the dials are set that's produced by Thompson—with the automobile it's any of many parts, including the torque converter stator for the automatic transmission.

Gas meter housings and torque converters are but two of the many light, strong, durable castings designed, developed and manufactured by Thompson for a diversified list of customer uses. Today Thompson is producing light metal castings for such products as buses and garbage disposers; washing machines and jet planes; automobiles and industrial engines; ice scoops and aircraft engines.

Behind this ability to aid all forms of industry are over 50 years experience in research and manufacture of precision metal parts. Regardless of your product, if you use castings, Thompson's creative engineers will gladly show you where and how you can simplify your operations and save on costs with Thompson Light Metals Castings.

For a detailed description of the Thompson Light Metals facilities which are available to you, send for your free copy of "Creative Castings." Just write to Dept. A-1, Light Metals Division, Thompson Products, Inc., 2269 Ashland Road, Cleveland 3, Ohio.

You can count on

Thompson Products

LIGHT METALS DIVISION
2269 Ashland Rd. • Cleveland 3, Ohio

(*Continued from page* 162)

KENTUCKY MANUFACTURING CO., Louisville, Kentucky
Commercial vehicles—46—$227,049

KENWORTH MOTOR TRUCK CORP., Seattle, Washington
Automotive spare parts for T-10 transporter—$129,842

KINGSBURY MACHINE TOOL CORP., Keene, New Hampshire
Machines, four-spindle, semi-automatic—10—$71,345

KOLLSMAN INSTRUMENT CORP., Elmhurst, New York
Speed indicator—136 ea—$54,074
True airspeed and machnumber computer—200 ea—$521,652

LeTOURNEAU-WESTINGHOUSE CO., Peoria, Illinois
Tractor, wheel type, pneumatic tired—6 ea—$224,160

LINK AVIATION, INC., Binghamton, New York
Simulator—3—$2,102,556
Trainer—15 ea—$928,896

LINN COACH & TRUCK CO., Oneonta, New York
Tactical vehicles—42—$33,285

LOCKHEED AIRCRAFT CORP., Burbank, Calif.
Facilities—$1,100,000

McCULLOCH MOTORS CORP., Los Angeles, Calif.
Target drone engines—$150,000
Maintenance parts—Various—$167,858

MARMON-HERRINGTON CO., INC., Indianapolis, Ind.
Type MB-1 aircraft crash fire fighting trucks—8—$3,354,592

THE NEW BRITAIN MACHINE CO., New Britain-Gridley Machine Div., New Britain, Conn.
Automatic screw machine, six-spindle—7—$172,641

NILES-BEMENT-POND COMPANY, Chandler Evans Div., West Hartford, Conn.
Maintenance parts for carburetor—Various—$246,675

NORTH AMERICAN AVIATION, INC., Downey, Calif.
Facilities—$500,000

NORTH AMERICAN AVIATION, INC., Columbus Div., Columbus, Ohio
Maintenance parts—Various—$69,822

OUTBOARD MARINE & MANUFACTURING CO., Johnson Motors Div., Waukegan, Illinois
Outboard motors, D-422-B—707 ea—$311,080
Repair parts—2595—$63,375

PACIFIC AIRMOTIVE CORP., Burbank, Calif.
Test stand, aircraft fuel—Various—$84,214

PARKER AIRCRAFT CO., Los Angeles, Calif.
Valve assys—40—$108,687

PIPER AIRCRAFT CORP., Lock Haven, Pa.
Airplanes, airframe spares, engine spares $65,447

REO MOTORS, INC., Lansing, Michigan
Auto spare parts—8175—$35,057
5 T 8x8 cargo, trucks and spare parts—4 trucks—11 set—$182,000
Trucks, 2½T, 6x6—sp. pts.—410—$2,469,859
Kits, tarpaulins and end curtain assy—1232—$85,008

SCIAKY BROS., INC., Chicago, Illinois
Welding machines—$180,266

(*Turn to page* 168, *please*)

if the FLEET OWNER built his own trucks—





ZENITH CARBURETORS

would be *his* choice

They say it's a buyer's market. Well the truth is, for the truck operator, it's always been a buyer's market.

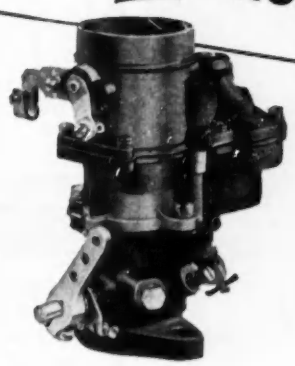
No American businessman sets more exacting standards than the fleet operator in his purchase of new equipment. There is good reason for this, for the operator's success or failure is to a very large degree determined by the efficiency of the vehicle he employs.

This yardstick of efficiency is likewise applied to every component part that contributes to truck performance.

That's why you can be certain if truck operators built their own trucks, Zenith* would be the choice for standard equipment.

One more reason why—if you build, buy, sell or operate trucks, Zenith should be *your* choice for the best in carburetion.

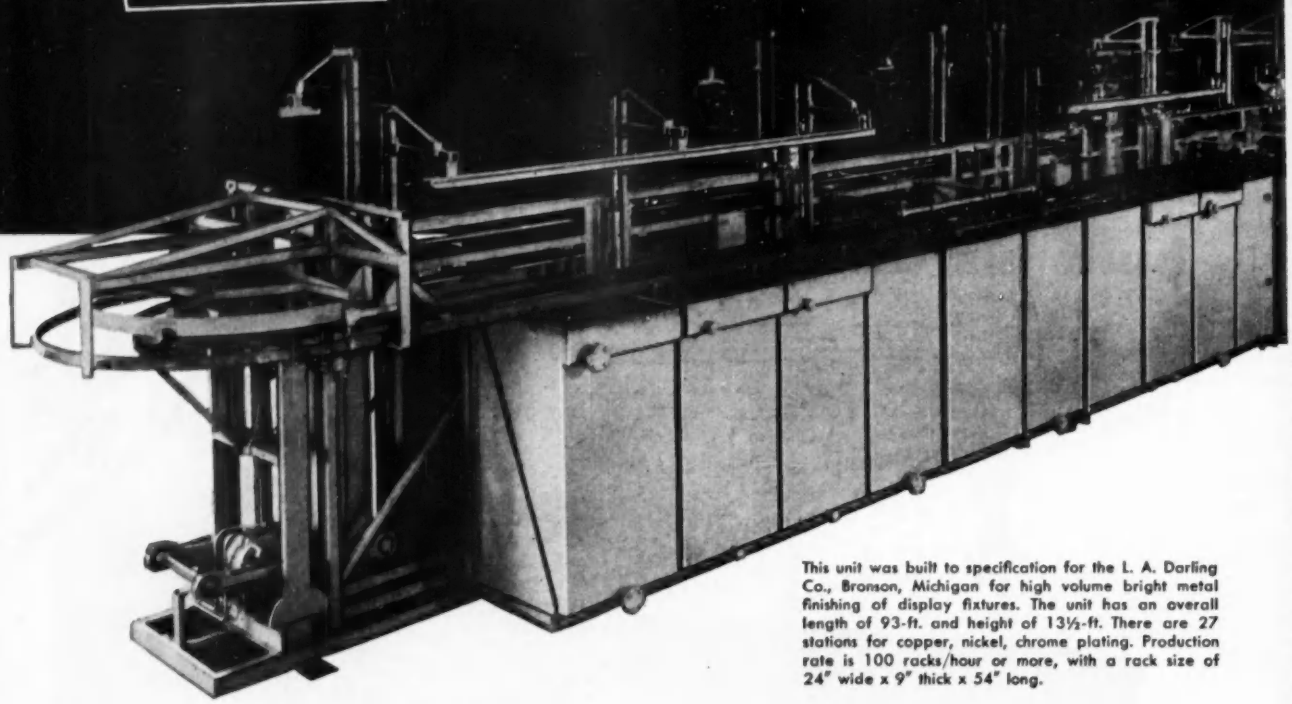
*REG. U.S. PAT. OFF.



ZENITH CARBURETOR DIVISION OF Bendix AVIATION CORPORATION

696 Hart Avenue, Detroit 14, Michigan • Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

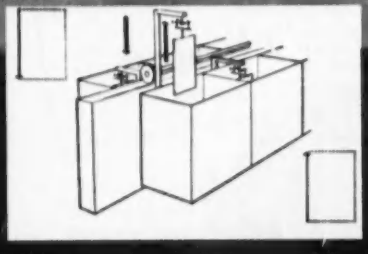
ONLY Wagner BROTHERS CAN OFFER YOU THIS..



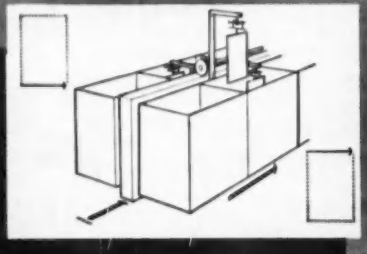
This unit was built to specification for the L. A. Darling Co., Bronson, Michigan for high volume bright metal finishing of display fixtures. The unit has an overall length of 93-ft. and height of 13½-ft. There are 27 stations for copper, nickel, chrome plating. Production rate is 100 racks/hour or more, with a rack size of 24" wide x 9" thick x 54" long.

Revolutionary Concept.....

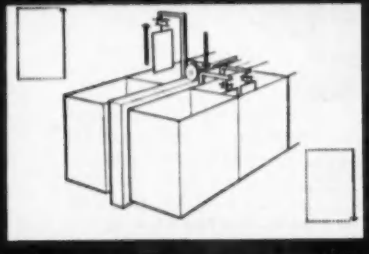
The Wagner Brothers Automatic is a complete and fully automatic mechanism, incorporating a revolutionary vertical transfer and return type work conveying principle which eliminates elevating superstructure, transfer cams, chains and sprockets and hydraulic cylinders above tanks. Many unique design features combine to make this mechanism a smooth operating, perfectly timed unit requiring less than ½ the power of comparably sized units.



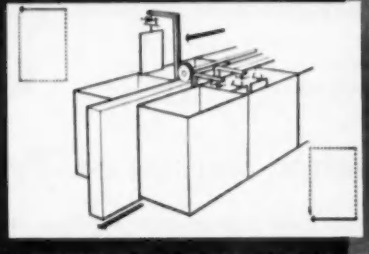
FIRST VERTICAL MOTION



FIRST HORIZONTAL MOTION



SECOND VERTICAL MOTION



SECOND HORIZONTAL MOTION

HOW IT WORKS

All transfer and conveying mechanism is mounted on a reciprocating carriage located between the two rows of tanks. Two basic movements are used to bring parts through the full plating cycle: one forward and reverse straight line horizontal motion and one raising and lowering vertical movement.

Plating racks are attached to work-carriers at the loading station. When the machine is started, lifting arms fixed to the carriage engage the work-carriers being transferred and lift them at all transfer points on one side of the machine, carry them forward to the next station where they are lowered and disengaged from the lifting arm. This sequence is simultaneously produced in reverse on the opposite side so that, when the lifting arms are being lowered on one side, they are raised on the other side.



ADVANTAGES

SMOOTH OPERATION—Operates so smoothly that you can balance a full water glass on the transfer mechanism throughout the entire plating cycle. Obviously such smooth operation will save you time now spent salvaging parts from tanks, dropped there because of the jolting transfer action of ordinary machines.

LOW POWER REQUIREMENTS—Powered by one 10 hp motor, this installation uses less than half the power required by comparably-sized units.

MINIMUM OF MAINTENANCE—There are few moving parts to wear, no vibrating parts, no backlash in automation, nor little chance of misalignment. Overload protection is given by a by-pass in the hydraulic pump which prevents destructive jamming. All working parts can be reached for adjustment without disassembly. Maintenance is reduced to a fraction of that usually required.

....IN PLATING AUTOMATION

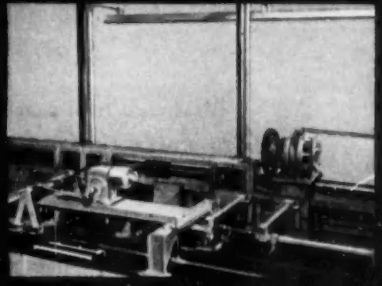
SIMPLE INSTALLATION—Your Wagner Brothers Automatic is delivered to you, either intact or in two or three completely assembled sections, depending upon size. Installation is simply a matter of positioning and leveling. You can imagine the savings in installation costs ordinarily required.

OTHER PLUS FEATURES—Wagner Brothers Automatics require a minimum of space. The model illustrated uses 54-inch racks and operates under a 13½-ft. ceiling. There are no greased parts or hydraulic fittings over tanks where dripping oil could contaminate solutions. Triple contacts on cathode bars afford consistent, uninterrupted current flow. Automatic heat control system gives simple, foolproof regulation of temperature for accurate results. Centralized lubrication can be provided as an optional feature. Drag and dwell times are easily varied with this unit.

In addition to high-volume plating, the Wagner Brothers' Automatic is equally well-suited to anodizing (sulphuric and chromic), phosphate coating, etching, electropolishing, oxide coating.

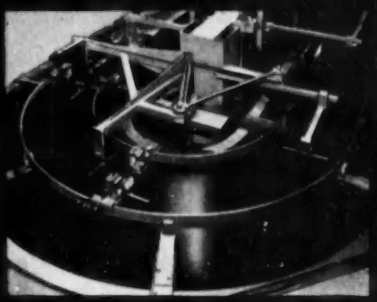
AGITATOR MECHANISM

Operating independently of the plating machine, a speed reducer furnishes agitation for the nickel plating tank at the rate of 10 to 14 ft./min., with a 3-inch stroke.



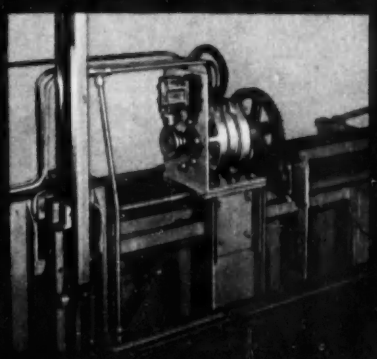
END TANK PUSHER ARM ASSEMBLY

Work-carriers, sliding on two electrified rails, are pushed around the end tank by a circular pushing arm and linkage arrangement to a point where they are again engaged by the lifting arms of the carriage to complete the plating cycle.



HYDROMOTORS FOR VERTICAL MOTION

Vertical motions are imparted to the work lifting arms by the two hydromotors mounted on the carriage, connected by rack and pinion gearing by a shaft running the length of the machine. Timing is effectively controlled by the eccentric arrangement on the one hydromotor, causing the arms on one side of the machine to rise while those on the other side are lowered.



HYDROMOTOR FOR HORIZONTAL MOTION

The transfer carriage, suspended on rollers moving over an oil-filled channel track, is actuated by this single hydromotor mounted at the base of the machine. Fitted with a crank and link, the hydromotor translates the simple harmonic motion of the motor shaft to the in-line reciprocating motion of the carriage. Note the convenient, easily accessible grouping of limit switches on the frame. Only four are required for the entire machine.



semi-automatics • precision hard chrome units • plating barrels • tanks and linings filters • rectifiers • anodes solutions • supplies.

YOUR PRIMARY SOURCE FOR PLATING AND POLISHING EQUIPMENT AND SUPPLIES

Wagner BROTHERS, INC.

400 MIDLAND AVE. • DETROIT 3, MICHIGAN

CHICAGO • ROCHESTER • CLEVELAND • CINCINNATI
ST. LOUIS • INDIANAPOLIS • NEW YORK

WAGNER BROTHERS, INC., 437 Midland Ave., Detroit, Mich.

☐ Please send information describing Wagner Brothers Automatics

☐ Please send name of representative

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State_____

(*Continued from page 164*)

SEALED POWER CORP., Muskegon, Mich.
Parts—8393—$108,857
R. H. SHEPPARD CO., INC., Hanover, Pa.
Spare parts for generator set—1 lot—$66,388
SUNDSTRAND MACHINE TOOL CO., Rockford, Ill.
Mill, horizontal—1—$74,567
Alternator constant speed drives—953—$10,404,456
THOMPSON PRODUCTS, INC., Cleveland, Ohio
Overhaul—810 ea—$160,000
Pump assys—Various—$49,375
Fuel Pump—300 ea—$118,086
UNITED AIRCRAFT CORP., Hamilton Standard Div., Windsor Locks, Connecticut
Propeller parts—Various—$26,795
UNITED AIRCRAFT CORP., Sikorsky Aircraft Div., Bridgeport, Conn.
Spare parts—1 lot—$224,733
Facilities—$6,812,127
UNIVERSAL PRODUCTS CO., INC., Dearborn, Mich.
Auto spare parts—1736—$43,951
VICKERS, INC., Detroit, Michigan
T-10 transporters and spare parts—466—$48,248
Maintenance parts used on pumps—Various—$30,653
Hydraulic motor assy—69 ea—$26,355
WESTINGHOUSE AIR BRAKE CO., Pittsburgh, Pa.
Trainers, flight simulator—2 ea—$950,000
WESTINGHOUSE ELECTRIC CORP., Phila., Pa.
Services and material for J46 engines—Various—$95,150
WESTINGHOUSE ELECTRIC CORP., Dayton, Ohio
Generator, regulators, voltage—155—$53,006
WILLYS MOTORS, INC., Richmond Machining Div., Richmond, Calif.
Facilities—$2,300,000
THE YALE & TOWNE MANUFACTURING CO., Yale Materials Handling Div., Philadelphia, Pa.
Trucks, fork lift—72—$304,046



DESIGN

ROCKFORD CLUTCHES provide the advantages of heat-treated, hardened and ground steels — flat, non-grab facings — heat dissipation — dirt exclusion — and fine adjustments. These wear-resisting, life-lengthing clutch features are essential to designs that must be projected with a thought to uses of tomorrow. ROCKFORD engineers now are working with many companies on their future designs — to provide custom-engineered clutches for long range economy. Their services are available to you.

Send for This Handy Bulletin



Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

BW

ROCKFORD CLUTCH DIVISION
BORG-WARNER
315 Catherine Street, Rockford, Illinois

ROCKFORD CLUTCHES

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to June 30, 1954, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the August 15 issue, page 124, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Office of Defense Mobilization, covering the period from July 1 to July 28, 1954.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

AIRESEARCH MANUFACTURING CO. of Arizona, Div. of the Garrett Corp., Phoenix, Ariz.
Research and development of aircraft parts—$350,000 (40)
BENDIX AVIATION CORP., Hamilton Div., Hamilton, Ohio
Aircraft parts—$106,346 (55)
ETHYL CORP., San Bernardino, Calif.
Research and development facilities—$140,000 (60)
FAIRCHILD ENGINE AND AIRPLANE CORP., Fairchild Guided Missiles Div., Wyandanch, L. I., N. Y.
Ordnance—$123,693 (65)
FAIRCHILD ENGINE AND AIRPLANE CORP., Stratos Div., Bay Shore, L. I., N. Y.
Aircraft parts—$111,169 (65)
LOCKHEED AIRCRAFT CORP., Missile Systems Div., Burbank, Calif.
Research and development for aircraft—$415,723 (65)
SOLAR AIRCRAFT COMPANY, San Diego, Calif.
Aircraft parts—$207,894 (60)

AUTOMOTIVE INDUSTRIES . . .

Is your News Magazine of Automotive and Aviation

MANUFACTURING



There's another New Star in the Le Roi Power Lineup!

The F330 330 cu. in.

...a valve-in-head, six-cylinder, heavy-duty engine designed to give you economical, dependable, 107 hp at 2500 rpm

Here it is, Le Roi's new 330-cu. in. engine, the F330.

Like all Le Roi heavy-duty engines, it has overhead valves to provide maximum performance and the utmost economy.

Also, the F330 has all the features that have been standard in Le Roi engines for many years — features like removable wet-cylinder sleeves that keep maintenance costs down and add greatly to the operating life of this magnificent new engine.

But most important to you, here's a compact engine that is easy to install . . . an engine that's power-packed to provide the kind of peak performance that lends prestige to any piece of equipment in which it is used.

If you need a 330-cu. in. engine — and if you need the last word in modern engine design, you need this new Le Roi F330. It operates on gasoline, natural gas, or butane. For all the facts, write for our new bulletin.

LE ROI

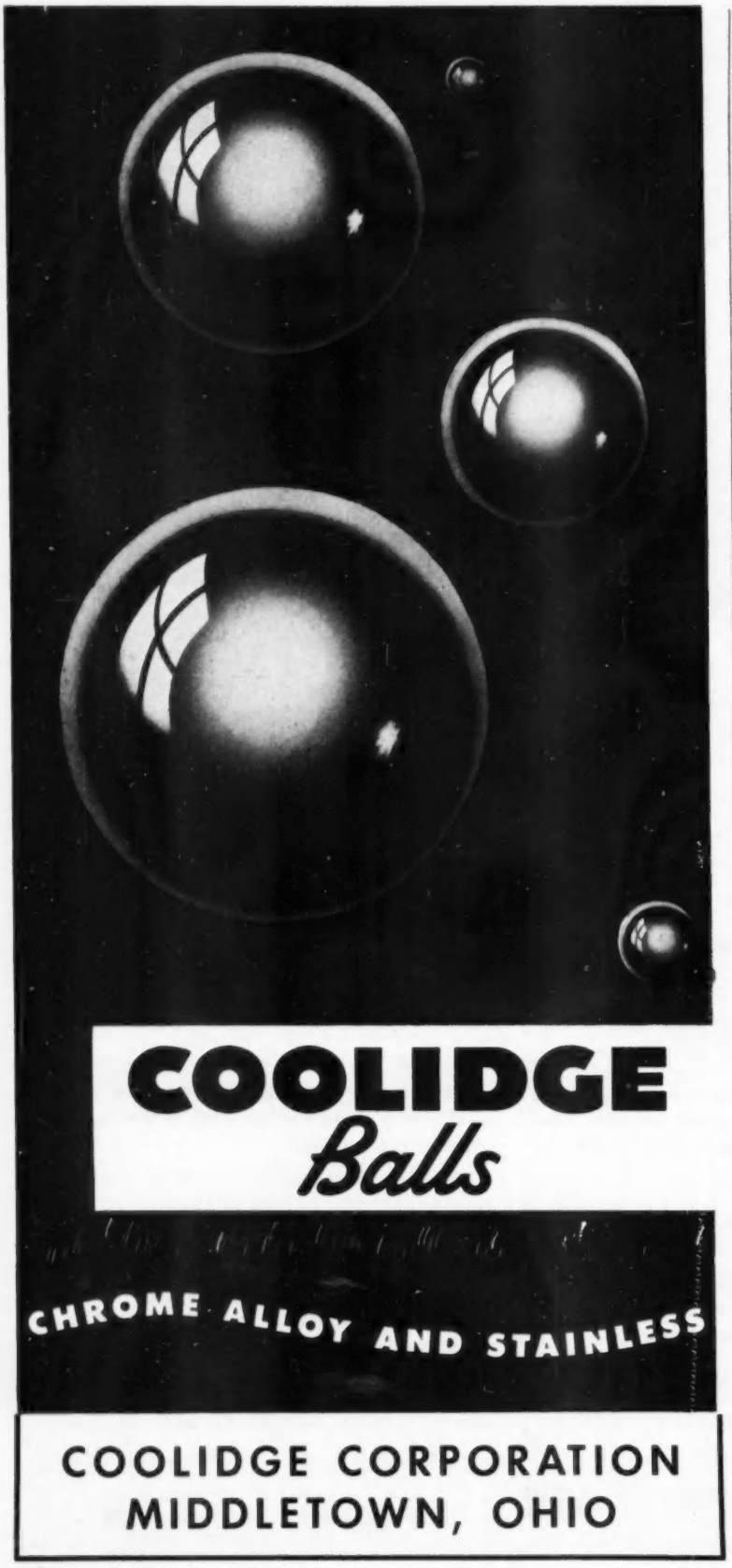
LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Michigan

E-101



News of the MACHINERY INDUSTRIES

(Continued from page 79)

that it will continue to use a bailment lease as do most machinery makers. Automation is also playing a large role in the construction of new equipment, particularly that ordered for some of the new passenger car engine programs.

Marx New MED Director

The U. S. Department of Commerce has announced the appointment of Graham Evans Marx, vice president and general manager of the G. A. Gray Co., Cincinnati, as Director of the Metalworking Equipment Division of the Business and Defense Services Administration. He succeeds Ralph E. Cross, executive vice president of the Cross Co., Detroit, who was recently appointed an Assistant Administrator of BDSA.

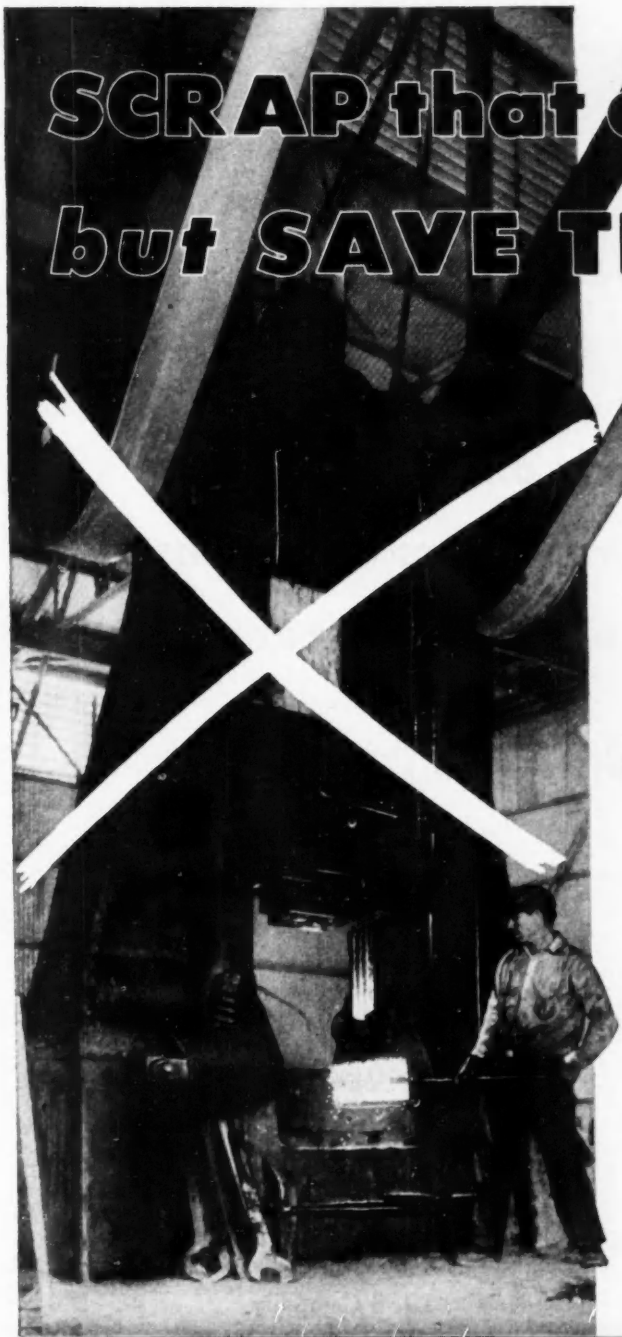
One of Its Own

Since its introduction, about a year ago, the Monarch Machine Tool Co., Sidney, Ohio, has had its first opportunity to obtain one of its own 13-in. Model EE precision lathes for the plant toolroom. According to Monarch engineers, installation of the machine will provide a chance to study first hand the latest metal-removing features incorporated in it under conditions where the all-around top performance required is fully as exacting as any to be encountered elsewhere in industry. The machine has a hydraulic tailstock and a four-way rapid tool traverse.

Bryant Man Gives Market Potential

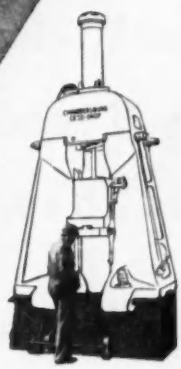
Francis E. Hummel of Bryant Chucking Grinder Co., Springfield, Vt., recently prepared a paper for the American Marketing Association which gives a unique statistical method of determining the market potential of machine tools in any particular state. By using a series of weights, Mr. Hummel found, for example, that 80 per cent of the U. S. market for precision boring machines and over 85 per cent of the U. S. market for precision internal grinding machines is concentrated in only 10 states in the country. As a matter of

(Turn to page 174, please)



SCRAP that old hammer but SAVE THE ANVIL!

MOUNT A CECO-DROP UPPER-WORKS ON IT



To meet competition, your best bet is to scrap your old unproductive gravity drop hammers and install Ceco-Drops, the most modern, most productive drop hammers ever built. And for quick changeover at minimum cost, you can have Ceco-Drop upper-works fitted to your present anvil. You have all the benefits of modernization without the time and expense of replacing the anvil or disturbing the foundation.

Write for Bulletin 57-L-4

CECO-DROP

Made by the BUILDERS of THE IMPACTER

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.



BLISS' 1000th Transfer Feed Press

***It feeds itself \ checks and corrects errors \ performs 11 separate press operations \ and delivers 28 completed parts per minute ***

all automatically

At Ford Motor Company's Ypsilanti plant, the Bliss 13-station transfer feed press turns out starter brush end plates—a part which was formerly die cast.

The press takes the 0.090-inch blank, puts it through six successive draws, flanges it, irons the cup within a tolerance of ±0.0005" on the I.D., restrikes the flange, pierces ten tiny holes, lances four locating tabs, and then trims the part to final diameter. Tolerance range throughout: from ±0.0005" to ±0.005".

And while all this is going on all the attendant has to do is keep the turret mechanism loaded with blanks!

However, the truly unusual feature of the press is this: practically everything that can go wrong has been anticipated and guarded against by electrical control circuits. Tiny switches police trouble areas and take corrective measures when needed.

In short, the press thinks as it works—*that's* automation. An up-to-the-moment example of Bliss press engineering, this transfer feed press is the thousandth such press produced by Bliss since it pioneered the transfer feed principle back in the 90's. Today Bliss transfer feed presses are a by-word in arsenals, can-making and metalworking plants—wherever speed and accuracy are musts.

If you have a pressroom problem—large or small—a Bliss field engineer will be glad to help you in whatever way he can. And behind him stands the resources of the entire Bliss organization—the world's largest press builder.

E. W. BLISS Company
Canton, Ohio
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

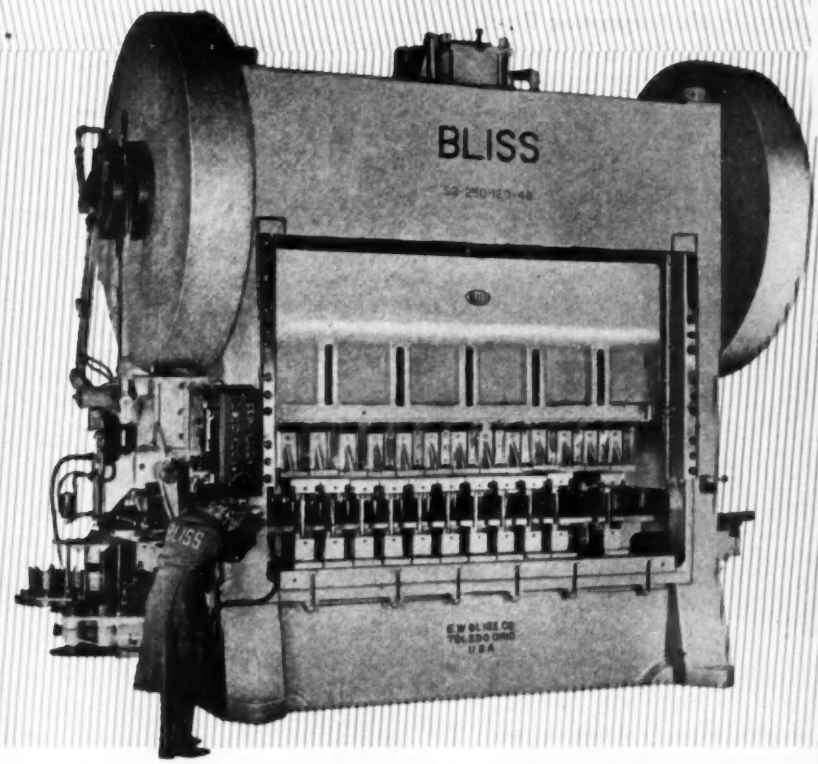
BLISS
SINCE 1857

Remember: BLISS is more than a name . . . it's a guarantee

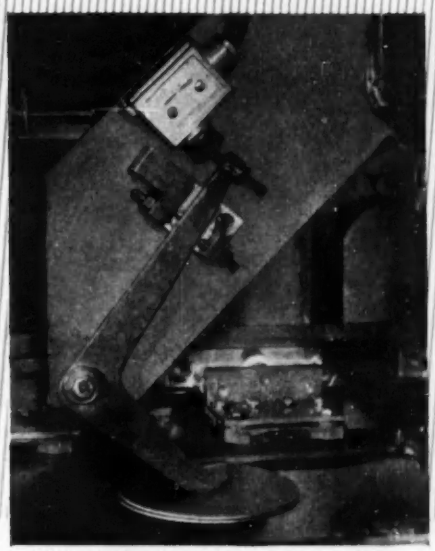
Subsidiary: The Die Supply Co., Cleveland, O. • E. W. Bliss (England) Ltd., Derby • E. W. Bliss Co. (Paris) France
U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, Calif. *Branch Offices* in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada.
Other representatives throughout the world.



STAMPING SEQUENCE... The first six, from left to right, are successive draws. Step seven forms the flange. Eight irons the cup to size (tolerance here: 0.0005″ on the I.D.) and restrikes the flange. Step nine: ten holes are precisely pierced. Next, the four locating tabs on the flange are lanced. The final operation trims the diameter all around. Blank size: 5″ diameter by 0.090″ thick. Tolerance range: from ±0.0005″ to ±0.005″. Production rate: up to 28 per minute.



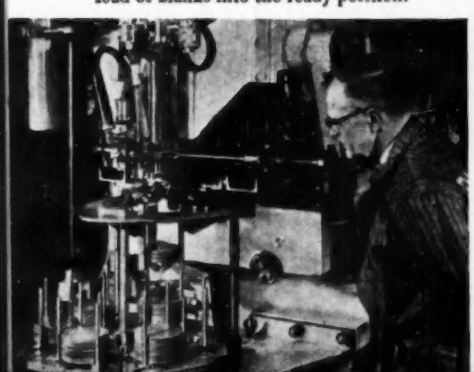
VITAL STATISTICS... Straight side double crank design; 120″ between uprights; 48″ front to back; single geared with twin drive; gears totally enclosed and immersed in oil bath; speed adjustment—14 to 28 spm; stroke of slide 8″—motorized slide adjustment range 10″; cam-actuated knockouts in individual slides accommodate various shell heights; high-speed single disc air clutch. Press and die design has purposely been kept flexible so that it can be readily adapted for a variety of jobs.



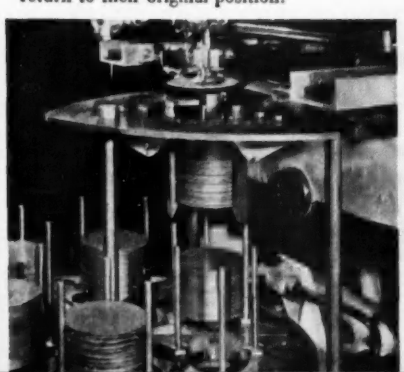
DOUBLE TROUBLE... When two blanks stick together and feed into the press, they lift this feeler, close the micro-switch and actuate a solenoid which opens a trap door in the press bed. The blanks fall through the trap door; the press goes on uninterrupted. That's typical of the many automatic safeguards incorporated into the press.

Automatic feed system: *all it requires is loading*

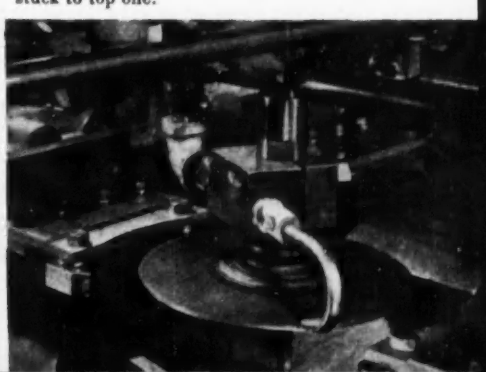
OVERALL VIEW shows the position of the automatic feed mechanism at the entry end of the press. Note that one load of blanks has been picked up from the six-station turret located below. Turret now moves next load of blanks into the ready position.



CLOSER VIEW shows vacuum cup holding a single blank between the slide bars. Close examination reveals the gripping fingers which will close in on the blank, grip it and then move it into the press, release it and return to their original position.



STILL CLOSER VIEW clearly shows gripping fingers in ready position as blank is held by vacuum cup. Curved tube in foreground shoots a blast of compressed air at side of blank to force off extra blanks that may be stuck to top one.



News of the MACHINERY INDUSTRIES

(Continued from page 170)

interest, he also stated that the proportion of internal grinding machines going to the automotive industries would increase due to the trend toward more power steering and automatic transmissions.

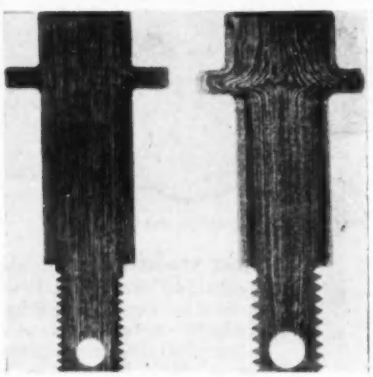
Joseph T. Vinbury of New Britain Machine Co., New Britain, Conn., stressed the subject of marketing during the recent NMTBA sales conference. He stated that machine tool companies definitely need more information of this type to look to the future. A great advocate of market research, Mr. Vinbury stated that in recent months more and more machine tool firms have established departments dedicated to market exploration.

Another Horsepower Race

According to K. R. Beardslee, general manager, Carboloy Dept., GE, in the next year or two a horsepower race will be on in the machine tool industry to keep pace with carbide tooling developments. He stated that the new carbide grades now under development will be much tougher and capable of making deeper cuts into the metals used by the metal-working industry.

Cold Forming Process

The extent to which modern cold-forming techniques permit severe displacement of metal without fracturing or interrupting grain structure is shown below. The part, made from steel wire, was acid-etched to show grain lines, then photographed at 3.5 x linear enlargement. This forming method retains maximum strength in both tension and shear, in contrast to the machined part at left where, particularly in the threaded section, weakness is introduced by cutting the grain structure sharply. The photograph at the right clearly shows compression of the outer fibres, indicating the increased surface hardness which is a natural characteristic of parts formed by Cold-Flow, a process developed by Camcar Screw & Mfg. Corp., Rockford, Ill.

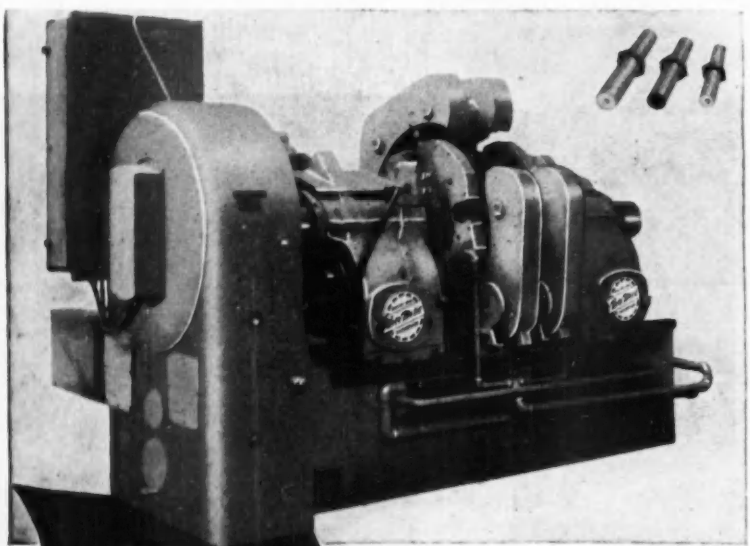


Experimental Foundry for Shell Molding

Sundstrand Machine Tool Co., Rockford, Ill., reports that in the six months ended June 30 earnings increased by 21 per cent over the first half of last year. Net after taxes but before renegotiation is over $1.3 million against $1.1 million for the same period of 1953. Sales during the first half were down $75,000 compared with '53. Sundstrand's backlog is more than $40 million—an increase of $12 million over last year's first half.

Monarch Machine Tool Co., Sidney, Ohio, reports net earnings after taxes

(Turn to page 178, please)



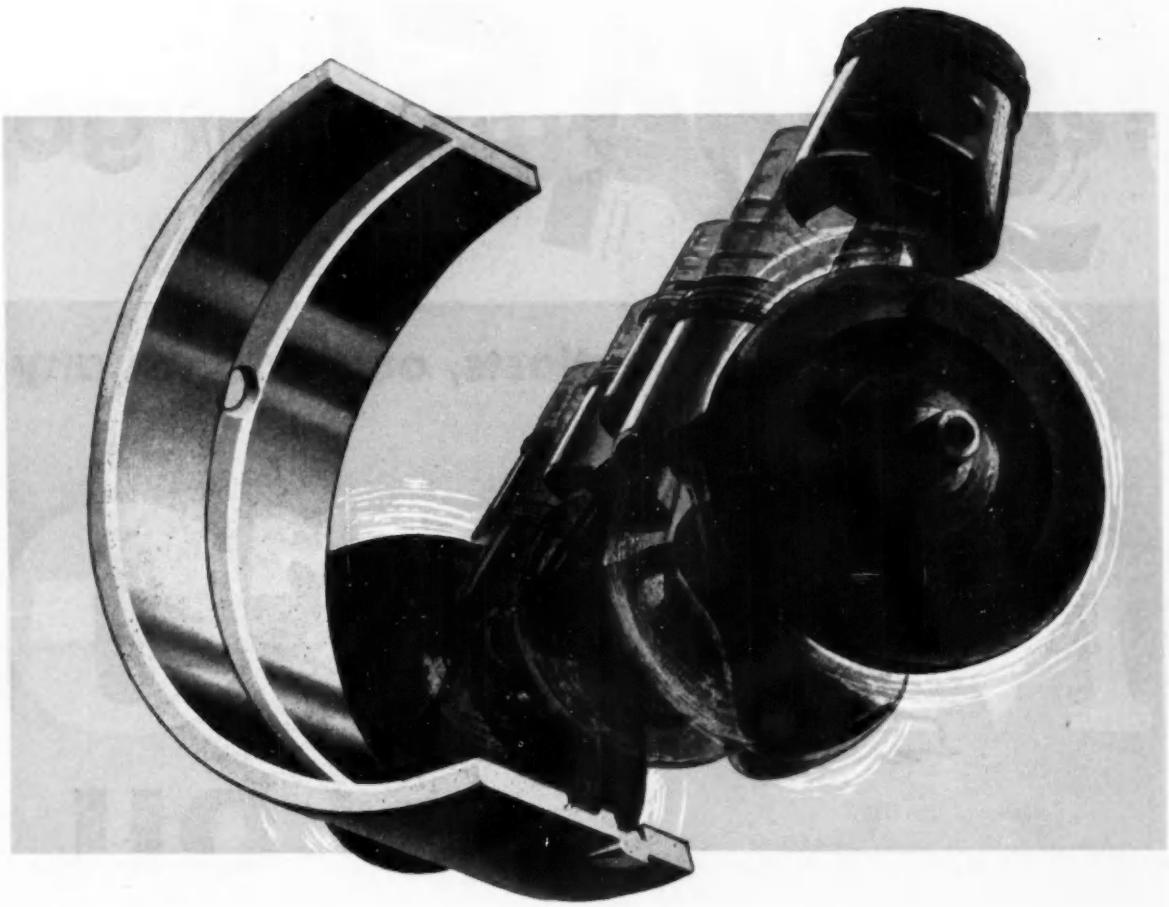
Milling and Centering Simultaneously and in Continuous Production

Here's an excellent example of how two entirely different operations can be combined on one machine. This Davis and Thompson continuous type Roto-Matic both mills and centers on both ends in one operation. Rough and finish milling cuts on the ends of the shaft and centering of both ends is completed with only one rotation of the fixture drum. The centering heads travel with the work station until centering operation is complete then drop back to next work station and repeat. Automatic equalizing clamping is provided to the fixture. Spindles have micrometric adjustment and spindle carriers are adjustable on the ways to accommodate shafts of various lengths.

FREE DATA on this and other Davis and Thompson machines is available in our bulletin No. 1000.

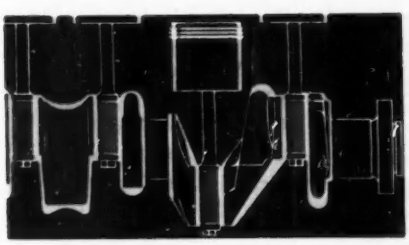
Roto-Matic Davis and Thompson Co.

4460 N. 124th ST. MILWAUKEE 16, WISCONSIN



moraine-400 bearings

handle more power... with less bearing length



The extraordinary toughness of Moraine-400 bearings permits the use of shorter bearings and journals, making room for thicker crank-arms. With Moraine-400, bearing length ceases to be a limiting factor in engine design.

Yes, now you can step up the horsepower and torque of a given engine without increasing crankshaft bearing area. Moraine-400 bearings permit you to make journals shorter and heavy-up the shaft between them. Result: a more rigid shaft capable of carrying greater piston loads.

Moraine-400's superior load-carrying ability is due to the extraordinary toughness of a new bearing metal developed by General Motors-Moraine research over a ten-year period. This aluminum-base alloy, bonded to a steel back, is so tough that Moraine-400 is consistently outperforming other bearings.

Moraine-400 bearings operate equally well on oil-hardened and Tocco-hardened shafts, and are outstandingly good in such qualities as embedability, conformability, and resistance to corrosion.

Note: Moraine also makes the famous Moraine-100 bearings—now used as original equipment on many of the nation's finest cars and trucks.

moraine products

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

SMASH go

Outlasts, outperforms any

NATIONAL Micro OIL

Lowest Torque

Highest Lubricity

No Measurable Leakage

Runs Cool, Lasts Longer

Sealing Lip Stores Oil

New National Micro-Torc Oil Seals, developed and offered only by National, absorb less power and last longer than any leather oil seal ever made. Properly employed, National Micro-Torc seals have *no measurable leakage throughout service life.*

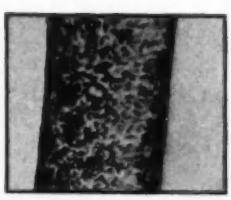


Figure 1
National Micro-Torc sealing member with "storage action"



Figure 2
Leather seal impervious because of complete rubber impregnation

National Micro-Torc sealing members are coated with an elastomer of high lubricity through which lubricants cannot pass, (Fig. 1). However the body of each sealing member retains its natural porosity. Thus, Micro-Torc sealing members absorb and store lubricant while permitting none to escape. This feature alone makes Micro-Torc the outstanding seal for starved or semi-starved applications.

©1954 National Motor Bearing Co., Inc.

performance records!



This is in sharp contrast with present-day leather seals which tend to saturate and leak, or completely rubber-impregnated leather seals (Figure 2) which are impervious to oil and can neither absorb nor store lubricant for periods when lubricant is not otherwise supplied.

TESTS SHOW SUPERIORITY

In a continuing series of identical 1,000 hour tests at National Motor Bearing Co., the marked superiority of National Micro-Torc Oil Seals over present day leather seals has been clearly demonstrated. Completely rubber-impregnated seals showed an average leakage of 1 to 5 grams per day. In addition, these seals hardened and became brittle after only 200 hours operation at 170° F.

By contrast, 90% of Micro-Torc seals tested *had no measurable leakage at all.* (Figure 3) Test conditions throughout the 1,000 hours were identical in every respect. At the end of the run, *every National Micro-Torc Seal was flexible and fully operative.*

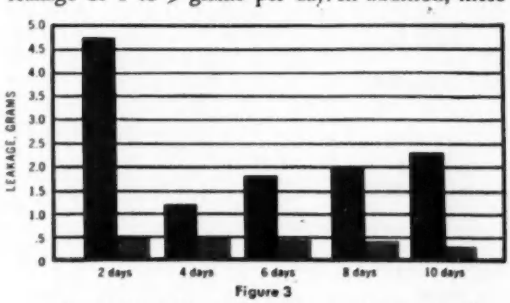


Figure 3

Zero-leakage performance of National Micro-Torc seals ■
in comparison with rubber-impregnated leather seals ■



TECHNICAL BULLETIN

Describes National Micro-Torc in detail, contains test results, performance charts. For your free copy, write Dept. D.



NATIONAL MOTOR BEARING CO., INC.
General Offices: Redwood City, Calif.
Plants: Redwood City, Calif.; Van Wert, Ohio

INDUSTRIAL POCKETSCOPE

by Waterman



MODEL S-11-A

DC-COUPLED WORK-HORSE OF INDUSTRY

Size:
11" x 5" x 7"
8¾ Pounds

ANOTHER EXAMPLE OF Waterman PIONEERING...

The INDUSTRIAL POCKETSCOPE, model S-11-A, has become America's most popular DC coupled oscilloscope because of its small size, light weight, and unique flexibility. This compact instrument has identical vertical and horizontal amplifiers which permit the observation of low frequency repetitive phenomena, while simultaneously eliminating undesirable trace bounce. Each amplifier sensitivity is 0.1 Volt rms/inch. The frequency responses are likewise identical, within —2 db from DC to 200 KC. Their total undistorted outputs permit effective trace expansion of twice the screen diameter. The internal sweep generator is continuously variable from 3 cycles to 50 KC and can be synchronized from positive going signals. Return trace blanking is optional. Intensity modulation is accomplished by connecting either directly to the grid of the three-inch cathode ray tube or thru an amplifier having a gain of approximately 10 and a flat response to 500 KC. Direct intensity modulation threshold voltage is approximately 1 volt rms. Additional provisions for direct access to all the deflection plates, the second anode, and the amplifier output terminals extend the usefulness of the S-11-A many fold.

WATERMAN PRODUCTS CO., INC.

PHILADELPHIA 25, PA.
CABLE ADDRESS: POKETSCOPE

MEMO... Write for details today!

WATERMAN PRODUCTS

WATERMAN PRODUCTS INCLUDE

S-4-C SAR PULSESCOPE®
S-5-A LAB PULSESCOPE
S-6-A BROADBAND PULSESCOPE
S-11-A INDUSTRIAL POCKETSCOPE®
S-12-B JANized RAKSCOPE®
S-14-A HIGH GAIN POCKETSCOPE
S-14-B WIDE BAND POCKETSCOPE
S-15-A TWIN TUBE POCKETSCOPE
RAYONIC® Cathode Ray Tubes
and Other Associated Equipment

News of the MACHINERY INDUSTRIES

(Continued from page 174)

for the first six months to be $994,300 as compared with $944,978 for the same period of 1953. Sales were off $3 million as of the end of June. The backlog was not reported in dollar volume, but Jerome Raterman, president, states that it is approaching a normal amount and that cancellations are practically non-existant.

BOOKS...

PICTORIAL HISTORY OF FLIGHT, *published by Year, Inc., 11833 Wilshire Blvd., Los Angeles 25, Calif. Prices, $10.00 (cloth binding); $12.00 (leather-type binding); $8.00 (heavy cloth paper binding); and $20.00 (all-leather binding).* Compiled in this book is a fascinating collection of actual news pictures of the dramatic milestones in aviation history, plus candid photographs of colorful aerial personalities whose exploits are legendary. Published to commemorate the 50th anniversary of powered flight, it contains 1000 pictures and 75,000 words. It portrays the complete story of aviation from man's earliest dreams to fly to jet planes and rockets. Each section covering an important period of air development is prefaced by statements from key aviation pioneers and leaders. Painstaking research has made the volume one of the most accurate and up-to-date histories of aviation ever published.

PRACTICAL GEAR DESIGN, *by D. W. Dudley, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price, $7.00.* This book provides a wealth of technical information for the efficient design, manufacture, and operation of gears. The author gives help on choosing the most suitable material for gears, calculating their load-carrying capacity, properly sizing the parts for economical production, handling the limitations imposed by various gear-cutting tools, and making sure the gears stand up under typical operating conditions. Step-by-step the essential procedures in designing and manufacturing all types of gears—spur, helical, worm, bevel are explained.

ASTM STANDARDS ON ENGINE ANTIFREEZES, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $1.25.* Included in this publication are all ASTM methods of test pertaining to engine antifreeze. Sponsored by ASTM Committee D-15 on Engine Antifreezes, this edition contains ten ASTM standards pertaining to engine antifreezes. Of eight methods, five included in the previous edition have been revised and one is new; also both specifications have been revised. Methods cover sampling and preparing aqueous solutions for testing purposes; freezing point of aqueous solution; physical tests for boiling point of engine antifreezes, and specific gravity of concentrated engine antifreezes by the hydrometer; chemical tests for ash content; reserve alkalinity; pH of concentrated engine antifreezes; and water in concentrated engine antifreezes by the iodine reagent method.



reduced to $16.32

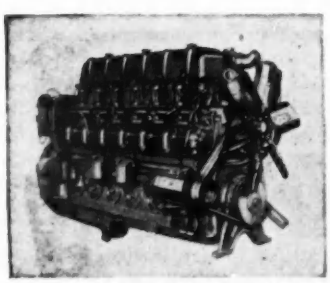
We can't sell you just one. We will sell you 30 to 255 "horses" at the lowest price you can buy diesel power: $16.32 a horsepower for the 6-cylinder model.

If you know diesel, you know there is nothing else like it. A diesel will take on any job you might give to a gasoline engine — and do it for one-third the cost. Not only that, it is simpler to maintain.

Buyers no longer ask *whether* diesel but *which* diesel. Which will deliver the most horsepower for the money? The most horsepower per pound of weight? Which is the easiest to service?

All three questions have one answer: *the P&H Diesel.*

P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.



Horsepowers, 30 to 255. Two-cycle. 2, 3, 4, 6-cylinder models. Speeds to 1800 rpm. Stationary, mobile, marine. Diesel-generator sets

THE P&H DIESEL

lowest price per horsepower . . .
lowest weight per horsepower

Brazil Encourages Establishment of New Truck Factories

By L. M. Peppercorn, Rio de Janeiro, Brazil

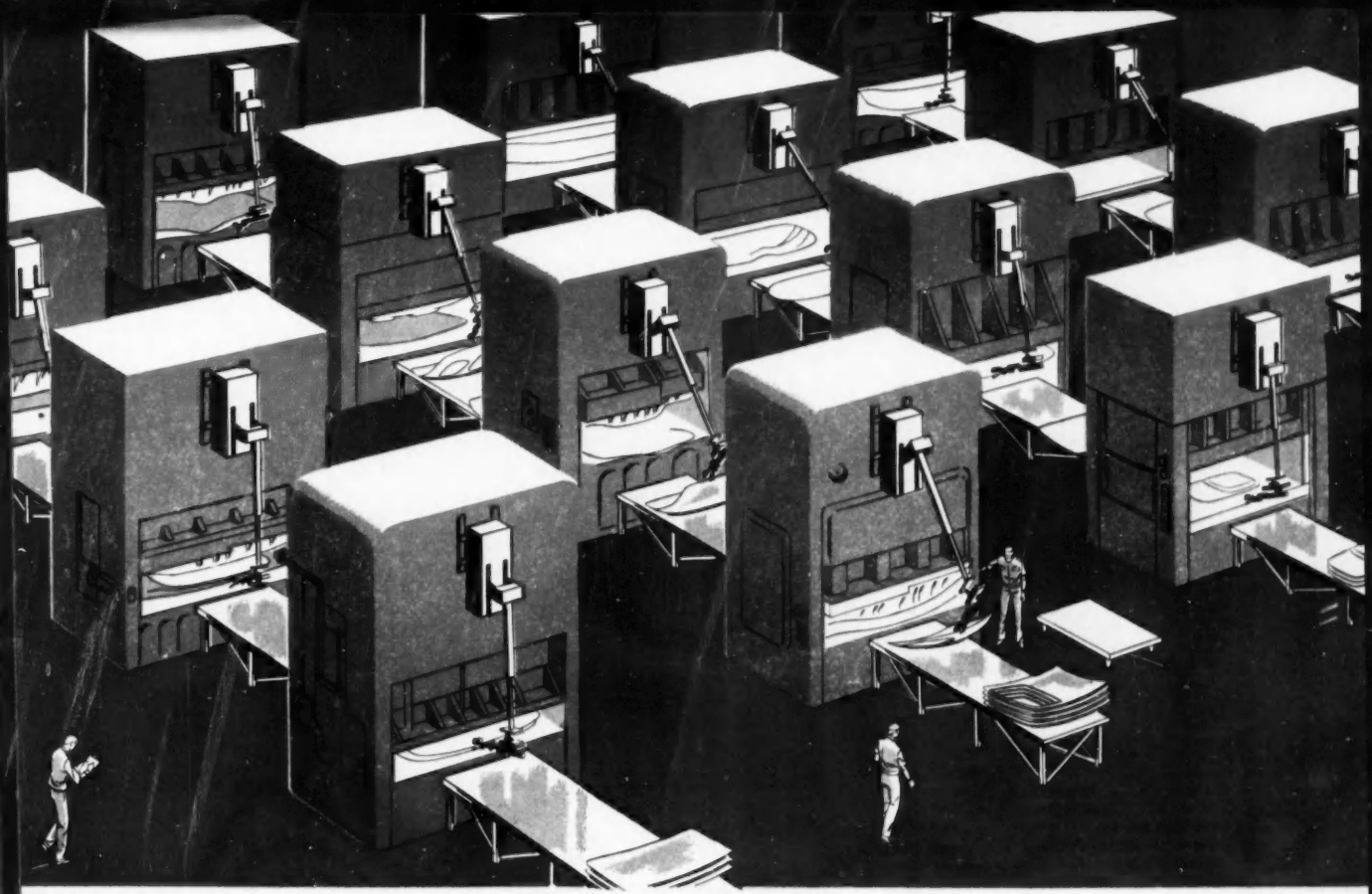
Brazil is encouraging the establishment of manufacturing enterprises in order to apply the foreign currency thus saved for other products to be imported from abroad. There is particular interest in the setting up of truck factories. To attract foreign capital investment, the Government is facilitating, to some extent, such establishments in the country by granting certain investment advantages to industries, considered by the Government as being of "outstanding" value to the country.

Such advantages include special consideration regarding capital repatriation. Because, according to decree 34,893 of January 5, 1954, which regulates the operation of law No. 2.145 of December 29, 1953, "while maintaining the right of transfer at any time at the free exchange rate established by law No. 1807 of January 7, 1953, the repatriation of foreign capital . . . actually invested in the country as from the date of this decree and registered at the Superintendency of Money and Credit (SUMOC) . . . will be permitted at the cost of the official exchange after 10 years . . . in annual quotas of 10 per cent to 20 per cent in accordance with the rules established by the Council of the SUMOC."

The "cost of the official exchange rate" is defined as follows: The official exchange rate of the cruzeiro is Cr. $18.82 to one dollar, but by cost is meant an additional Cr. $7.00. These seven cruzeiros are made up of the average of the premiums paid to Brazilian exporters, that is to say, Cr. $5.00 for each dollar to coffee exporters and Cr. $10.00 to all other exporters. It must be understood that while the cost of the official exchange rate comes thus to Cr. $25.82 this same cost may be different in another 10 years. Nobody can predict whether the official exchange rate will remain the same in the future, especially since rumors and denials of rumors of a currency devaluation have cropped up again and again. Also, nobody can anticipate if the premiums paid to exporters will not undergo any changes over a period of 10 years, as in some way it already has been since August 16 when the SUMOC issued a new decree regarding Brazilian exports. Cost of the official exchange rate for repatriation purposes is, naturally, always counted at the time when the repartiation will take place.

Also the investment into Brazil of capital for industries, considered as "outstanding" by the Government departments which examine such prospective enterprises, enjoys special treatment: Capital investments may be made up indiscriminately (a) by the sale of foreign exchange through the free market, also by the "importation, without exchange coverage, of machinery, equipment and tools not manufactured in sufficient quantity in the country, considered neces-





Automatic press lines have this in common—

The SAHLIN IRON HAND

America's top stamping plants are tooling up for automation in a really big way. Straight-flow, continuous press lines with batteries of five, six or more presses are a common sight today. And the key to virtually every continuous automated press line is the Sahlin Iron Hand—used to unload and transfer work quickly, safely and economically.

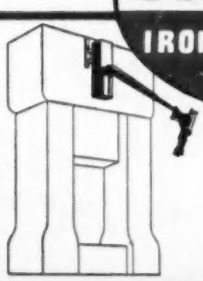
A prominent automaker, for example, found that *one* Iron Hand boosted his floor pan production by 125%. Another manufacturer doubled hood line production. Still another eliminated the need for four attendants. In every case they made their operations far safer—and saved on time . . . saved on labor.

But savings like these are possible not only in auto body plants, but throughout all mass production industries. The overhead-type Iron Hand is adaptable to all types of stampings, large and small . . . can be used on all types of presses and sheet metal machinery.

Our latest bulletin lists prominent installations, describes operation of the Iron Hand and shows various models in actual use. Send for a copy today and give your production a helping hand—with an Iron Hand.

SAHLIN IRON HAND

—to raise pressroom standards

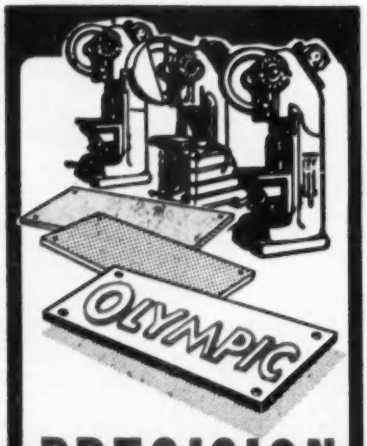


SAHLIN ENGINEERING COMPANY

750 West Maple Road, P. O. Box 289, Birmingham, Michigan

Representatives in: Dayton • Toledo • Pittsburgh • Philadelphia • Buffalo • Syracuse
Los Angeles • San Francisco • Seattle • London • Paris • Milan

OVERHEAD ARMS • FLOOR TYPE UNLOADERS • TURNOVER AND TRANSFER MACHINERY



PRECISION STAMPINGS
FOR THE AUTOMOTIVE INDUSTRY

Precision is an *established* habit at **OLYMPIC!** Close tolerances are met here with the ease and skill that come from 12 years' of leadership in meeting exacting electronics requirements. A record for *quality* gains notice . . . and so, key automotive designers, specifiers, and engineers now request great numbers of **OLYMPIC** *precision* stampings for every automotive need. And here are some good reasons why:

- **FACILITIES** . . . *complete* sample shop, engineering, design, and production departments at *your* disposal.
- **PRECISION METAL STAMPINGS** . . . *any* particular requirements met to *exact* specifications.
- **FABRICATIONS AND DRAWINGS** . . . *all* metal shapes and sizes.
- **ASSEMBLIES** . . . *complete* assembly and modification service.



Let OLYMPIC experts help you consolidate and improve your stampings!

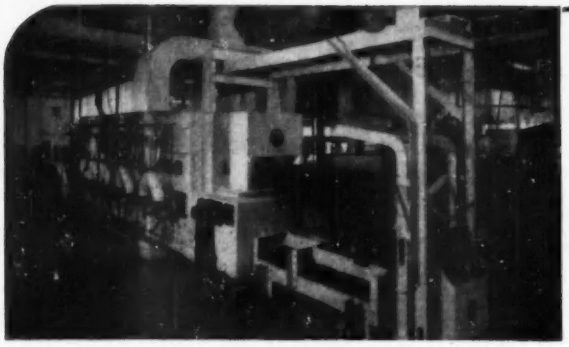
OLYMPIC
METAL PRODUCTS COMPANY, INC.
ALPHA, NEW JERSEY



sary for the complete installation or expansion of enterprises of an industrial . . . nature; (b) by the importation, without coverage, of complementary production goods under the following conditions, at the discretion of the Council of the Superintendency of Money and Credit; (1) that they be of technically acceptable types and characteristics, (2) that they are not manufactured in the country . . . (3) that the importation of the goods be subordinated to the effective installation in the country of the machinery, equipment and tools necessary for the full production of the enterprise."

In order to be considered an industry of "outstanding" interest for the country, the prospective party must submit to the sub-commission of jeeps, trucks, tractors and automobiles answers to a questionnaire which, after being approved by both the sub-committee and the Committee for the Industrial Development (to which the sub-committee acts as a consultant), the matter comes before the Council of the Superintendency of Money and Credit for decision.

The sub-committee will, however, soon cease to function, because there recently was named an executive commission of the Industry of Automotive Material which will not only substitute the sub-commission, but act autonomously, discarding with the approval of the Committee for Industrial Development. The Executive Committee will have members from the following commercial industrial and government organizations: Syndicate of Spare Part Industries, Syndicate of Assembling Industries, Syndicate of the Vehicle Industries, Syndicate of the Institute of Technology, Foreign Trade Department of the Bank of Brazil, the Discount Bank, and the Syndicate of the Vehicle Commerce. It is expected that the President of the Republic will shortly nominate one member of each group. Thus, this committee will likely begin to function in the near future.



EF
GAS-FIRED
OIL-FIRED
and ELECTRIC
FURNACES
for

AGING
ANNEALING
BRAZING
CARBON RESTORATION
CARBURIZING
CERAMIC DECORATING
DRAWING
HARDENING
HOMOGENIZING
MALLEABLIZING
NORMALIZING
NITRIDING
SINTERING
SOLUTION TREATING
SPECIAL ATMOSPHERE TREATMENTS

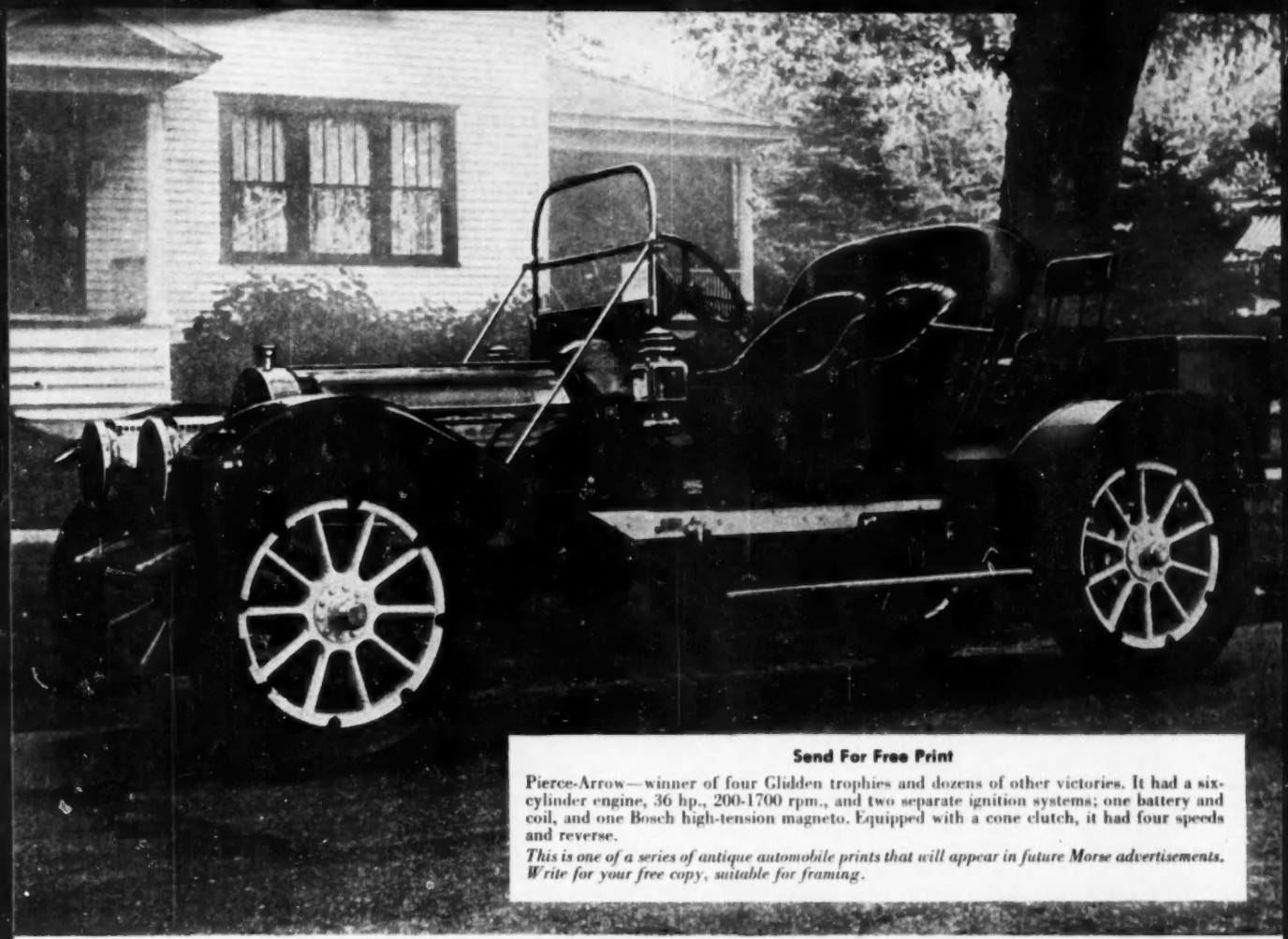
LOW COST HEAT TREATMENT
of small and medium size parts

● EF chain belt furnaces are the most satisfactory heat treating equipment yet devised for carbon restoration, scale free hardening and hardening without decarburization of small and medium size parts. Built in 11 standard sizes for capacities up to 2,000 lbs. per hour. Larger sizes to meet any requirement. Gas-fired, oil-fired or electrically heated, whichever best suits your particular requirement—and location. Estimates of equipment, installation and operating costs—and samples of treated parts—furnished promptly. Write for literature.

A SIZE AND TYPE OF FURNACE FOR EVERY PROCESS PRODUCT OR PRODUCTION

THE ELECTRIC FURNACE CO.
GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
Salem - Ohio

Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada



Send For Free Print

Pierce-Arrow—winner of four Glidden trophies and dozens of other victories. It had a six-cylinder engine, 36 hp., 200-1700 rpm., and two separate ignition systems; one battery and coil, and one Bosch high-tension magneto. Equipped with a cone clutch, it had four speeds and reverse.

This is one of a series of antique automobile prints that will appear in future Morse advertisements. Write for your free copy, suitable for framing.

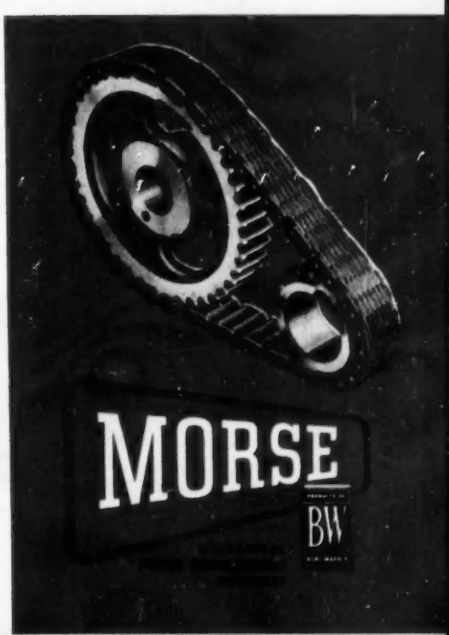
Have you used any of our 58,000,000 timing chain drives?

If you use Morse Timing Chain Drives, you know all about their economy, long service life, and relative freedom from maintenance.

If not, it may pay you handsomely to consider them as original equipment for your cars, trucks or buses. More than 58,000,000 of these drives have been installed in cars and trucks of over 100 different makes.

Whether your engines are in the design, development or application stages, Morse engineering service is available to help you solve your timing chain problems. Call or write us, today.

MORSE CHAIN COMPANY
7601 Central Avenue
DETROIT 10, MICHIGAN



M=TC

Morse *means* Timing Chains

Business Pulse

(Continued from page 96)

Better Pace for Nondurables

From all appearances nondurables maintained their better pace during the summer period. This is indicated, among other things, by the trend of department store sales, which are dominated by soft goods. The pattern of durable-goods sales is less certain because of weakness in the highly important automobile category. The old prewar pattern in automobile sales—a sharp break during the month preceding the introduction of new models—seems to have reappeared. This sluggishness has put a dent in over-all trade totals, but the judgment of analysts is that this dent is not indicative of a decline in consumers' willingness to buy. The feeling seems to be that consumer spending is definitely more buoyant than in the early part of the year, despite the leveling-off tendency of the summer period in total trade volume (durables plus nondurables).

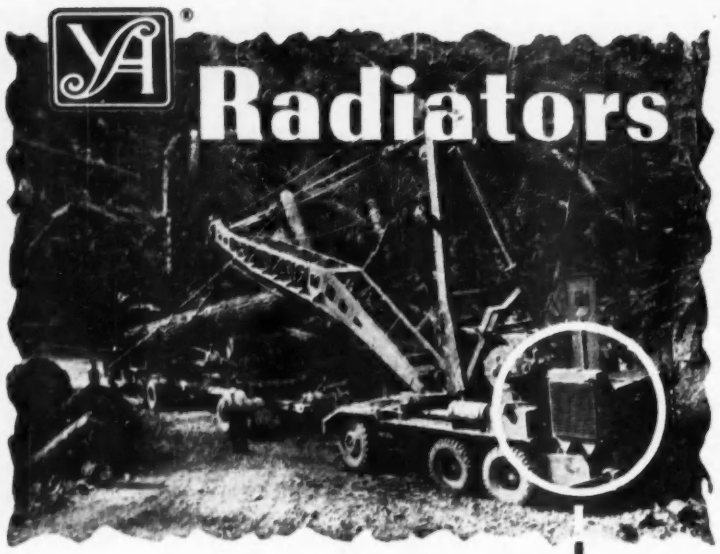
As for the autumn, merchants are generally optimistic, although they remain cautious in their forward buying policies. The consensus is that sales will run above those during the autumn of 1953. This belief apparently arises in part from the fact that the retail market was receding during the second half of 1953, but it also appears to be conditioned to some extent by optimism with respect to the general trend of business.

In the industrial sector of the economy, the summer was marked by the same stability that characterized general business. Industrial production during July — the latest month for which comprehensive data are available — held at the May-June level, on a seasonally adjusted basis. This has been interpreted as still further evidence that the business decline is over. Durables production actually showed a slight increase in July, as gains in such things as television output and furniture output more than offset a greater-than-seasonal drop in steel production and a sharp reduction in automobile assemblies. Virtually all categories of nondurables output were steady during July, while output of minerals eased moderately, primarily as a result of a decline in crude oil production.

Inventory Liquidation Continues

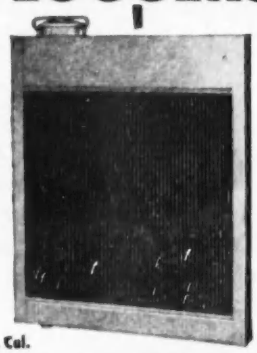
Available evidence suggests that inventory liquidation continues to have a retarding effect on business though on a more selective basis than earlier in the year. In July, the latest month for which information is available, manufacturers' inventories were cut by approximately the same over-all amount as in June, and the reduction, also as in previous months, was concentrated in the durables category. Significantly, however, liquidation reportedly was particularly evident in the transportation equipment industries. This probably stems from the special conditions which now prevail in the automobile industry as a consequence of preparation for model changeovers.

The situation in steel has implications for general business activity that extend well into the future. The inflow of new orders during the summer clearly fell below the hoped-for volume. This is attributed to overestimation on the part of producers of the probable demands of other consumers. It may have been due to failure to give sufficient weight to the



. . . provide efficient cooling for these
GIANT MOBILE LOGGERS!

WHERE the going is rugged . . . that's where you'll find Yates-American Radiators on the job! Typical is this scene of a Giant Mobile Logger working in the big timber in Rose Valley, Washington, yarding and loading on a salvage operation. Radiator equipment must have extra structural strength as well as efficient cooling characteristics. For information on YA Radiators for your equipment, write Yates-American.



California Representative: E. E. Richter & Son, Emeryville, Cal.

YA
Heat Transfer Products Division
Yates-American
BELOIT, WISCONSIN
BRANCH OFFICES: CHICAGO, ILLINOIS, HIGH POINT, NORTH CAROLINA, MEMPHIS, TENNESSEE, PORTLAND, OREGON



No seven-league boots needed... "U. S." is right at your door!

Things move far and fast when you phone United States Rubber Company sales engineers. The resources of the "U. S." laboratory and plant at Fort Wayne are put at your service right away. On behalf of the automotive industry, physicists, chemists, metallurgists and design engineers at Fort Wayne are constantly designing types of rubber-to-metal parts, precision molded rubber and plastic parts and precision extrusions—to make your products operate more economically, run more smoothly. Hand your problems over to "U. S." Phone Trinity 4-3500 and ask for Mechanical Goods Division, or write to address below.

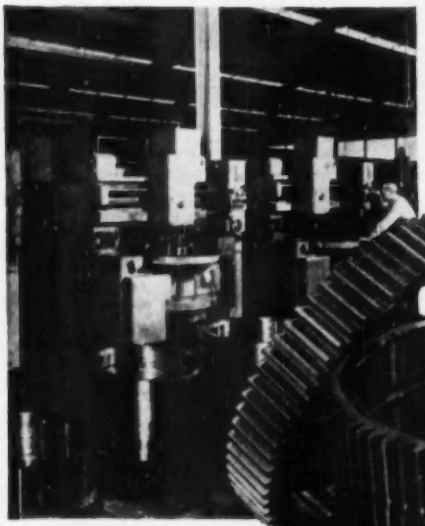
"U. S." Research perfects it
"U. S." Production builds it

US RUBBER

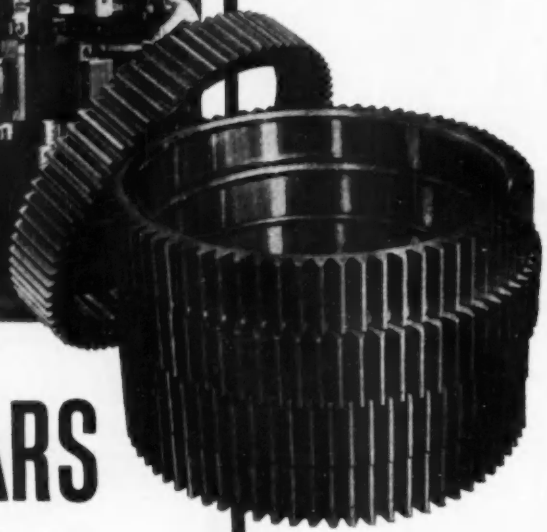
UNITED STATES RUBBER COMPANY

Automotive Sales, Mechanical Goods Division, New Center Bldg., Detroit 2, Michigan

● This picture shows a part of Fairfield's Spur Gear Cutting Department where finest, new equipment is used to produce gears up to 1½ pitch, 36" dia.



accuracy
economy
capacity



GEARS
by Fairfield

AT FAIRFIELD, you get the benefit of mass production ECONOMY, combined with every modern facility for manufacturing FINE GEARS!

Here "under one roof" is everything needed to meet your most exacting gear requirements — metallurgical department, batteries of the most modern machines, testing laboratories, complete heat-treating facilities — all operated by skilled craftsmen working under expert engineering supervision.

Get acquainted with the Manufacturing Service Fairfield offers to makers of agricultural implements, road building machinery, machine tools, engines, trucks, tractors, and all kinds of powered equipment. ***Your inquiry will receive prompt attention — ask for interesting, illustrated bulletin.***

FINE GEARS MADE TO ORDER

SPUR GEARS — Straight, helical, and internal. Sizes from 16 pitch, 1½" dia., to 1½ pitch, 36" dia.

HERRINGBONE—(*Follows Type*). Sizes from 1½" to 15".

SPIRAL BEVEL — Sizes from 16 pitch, 1½" dia., to 1½ pitch, 28" dia.

STRAIGHT BEVEL—Sizes from 16 pitch, 1½" dia., to 1½ pitch, 28" dia.

HYPOID—Sizes from 1½" to 28" dia.

ZEROL — Sizes from 16 pitch, 1½" dia., to 1½ pitch, 21" dia.

WORMS AND WORM GEARS—Worms to 7" dia. Worm gears to 36" dia.

SPLINED SHAFTS — Lengths to 52". Diameters from 1" to 6".

DIFFERENTIALS — 10,000 to 300,000 inch pounds capacity.

Note: All of the sizes above are approximate.



FAIRFIELD MANUFACTURING CO.

2303 South Concord Road • Lafayette, Indiana

hedge buying that preceded the wage settlement, and it may also have been due in some measure to underestimation by producers of the impact of mass employee vacations in steel-consuming industries. Whatever the reason, new business has been disappointing, and present opinion seems to be that no material improvement can be expected before the fourth quarter. Even then there seems to be no expectation of an appreciable upturn, and if this anticipation proves correct the odds will be against any spectacular upturn in general business.

Government Reports Discuss Titanium Machining Problems

Seven new Government reports on titanium emphasize the tool life of high-speed steel tools in turning and shaping operations.

The reports are the first in a series describing research by the Univ. of Michigan for the Army Ordnance Corps into the machinability of commercially-pure titanium and three titanium-base alloys—Ti 75A, RC 130B, and Ti 150A.

Copies of the new reports, listed below, are available at the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

PB 111295. *Preliminary Report on the "Cutting Characteristics of Titanium."* $1.00. Preliminary machining tests reveal basic data on chip formation, micro-hardness, tool life, and cutting forces.

PB 111296. *Mechanical Properties of Machinability Program Work Materials.* $1.00. Tensile tests are plotted as curves of stress versus natural strain. Results of Brinnell hardness tests are tabulated.

PB 111297. *Effect of Side Rake Angle on Tool Life in Turning Titanium.* $1.50. Rake angles studied range from −8 to 40 deg. Optimum angle for all materials was in the vicinity of 30 deg.

PB 111298. *Effect of Size of Cut on Tool Life in Turning Titanium.* $1.25. Cutting speed, tool life curves are given for high-speed-steel tools at various rates of feed and cutting depths.

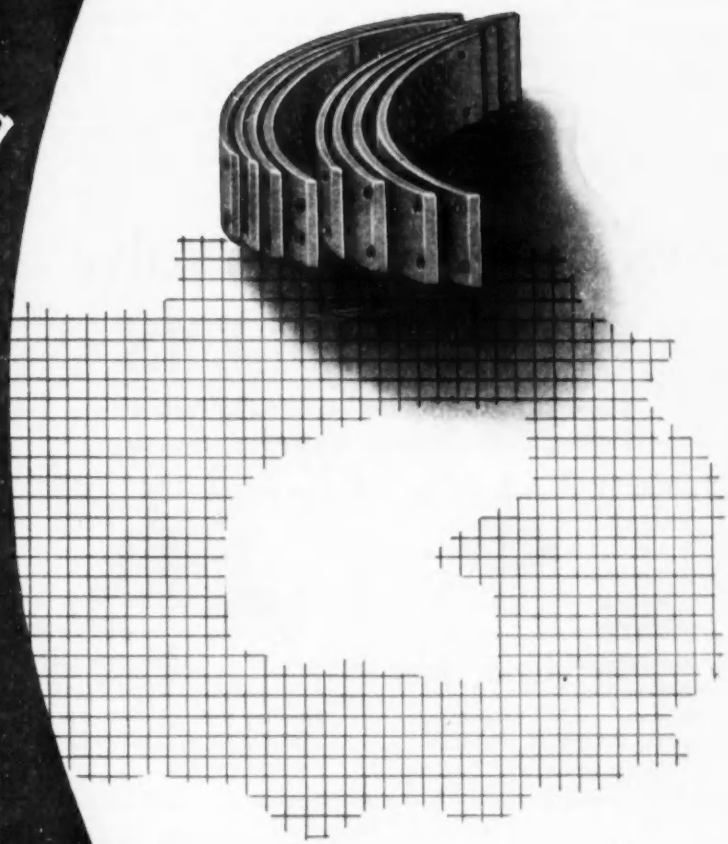
PB 111299. *Cutting Speed Versus Tool Life When Shaping Titanium with High-Speed Steel Tools.* $1.00. Results of tool-life tests on a shaper at a constant depth of cut of 0.050 in. and a feed of 0.010 in. per stroke.

PB 111300. *Power Hacksaw Operations on Titanium and its Alloys.* $1.00. Results of tests made with four pitch saws on a commercial machine operating at three different speeds. Saw materials were tungsten and molybdenum high-speed steel. Coolant was a 1:20 emulsion of soluble oil in water.

PB 111301. *Tool Life Versus Nose Radius When Turning Titanium.* 25 pages. $1.00. Cutting speed, tool life tests with nose radius of tool varied in the following sequence: 0, 0.010, 0.025, and 1/16 inch.



Finding THE RIGHT WIRE CLOTH *to fit* YOUR PRODUCT



Finding the right wire cloth to fit precisely the job it has to do in your product means more than the right type and size of wire, or mesh, or type of weave. It must be right metallurgically—to fit into your fabrication processing. It must be right chemically—to fit, or combat, product-in-use conditions. If it is Reynolds wire cloth it will be *right*—precision processed to your specifications. Details in *Sweet's Product Design File* . . . or consult Reynolds Engineers without cost or obligation.

Reynolds WIRE for Industry

NS NATIONAL-STANDARD Company NILES, MICHIGAN

REYNOLDS WIRE DIVISION, NATIONAL-STANDARD CO., Box 100 **DIXON, ILL.**

Divisions of National-Standard Co.

ATHENIA STEEL	*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
NATIONAL-STANDARD	*Niles, Mich.*	Tire Wire, Fabricated Braids and Tape
WAGNER LITHO MACHINERY	*Jersey City, N. J.*	Metal Decorating Equipment
WORCESTER WIRE WORKS	*Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes

AIRBRIEFS

(*Continued from page* 98)

By-Pass Controversy

Aircraft gas turbine engines use considerably more air than is required for combustion for the purpose of keeping the engine cool. Engineers for a decade have advocated a type of jet engine in which this excess air, instead of making the full trip through the compressor and turbine, passes around the engine through a tube encasing the engine and passes out the tailpipe, mixing with the hot combustion gases to form a powerful jet. This "by pass" design has been gathering momentum in military and airline circles as the answer to the king-size problem of turbojet fuel consumption. Airlines are so enthusiastic about the design they are pressuring the aircraft engine industry to rush development on the type as rapidly as possible. Only example of the type now in working order is the British Rolls-Royce Conway, rated at 11,500 lb of thrust. But many U. S. engineers are still bearish on such claims. NACA turbine experts Abe Silverstein and Bruce Lundin recently announced that their studies of the type do not indicate any definite superiority of the new engine type over those presently available. They point out that the power required to operate the fan inside the engine tube is remarkably close to the additional power expected from the arrangement over conventional turbojet engines. The technological battle, at this writing, seems a draw, but both the NACA and the engine manufacturers are continuing active research work on the idea.

Army-Airline 'Copters

The U. S. Army, world's largest user of helicopters, is urging a program under which transport helicopters would be operated by commercial helicopter airlines (New York, Chicago, Los Angeles and Miami) in order to provide service test time and the acceleration of maintenance procedures and spare parts programs, one of the big headaches delaying helicopter development. Under the program the Army would lease its new machines to these airlines for one or two years and share in operating costs according to individual contract arrangements. The helicopter airlines, however, are chary of the arrangement due to the experimental nature of the machines to be offered. For example, Clarence Belinn, president, Los Angeles Airways, insists that his airline will not carry passengers in any machine not fully certificated by the Civil Aeronautics Board. However, the Army says that it is interested in assigning only "off-the-shelf" helicopter transports and is willing to agree to obtain certification for types used. The Army, the Board, the Civil Aeronautics Administration, Air Transport Association and Aircraft Industries Association are now working jointly to speed up promulgation of transport helicopter airworthiness and operating requirements so that the new plan can be inaugurated. The Army, meanwhile, is ready to buy 1000 helicopters in the next four years if the plan can be accelerated.

Continental Production

Continental Aviation and Engineering Corp. has received a $2 million facilities contract from the Air Force for construction of production space

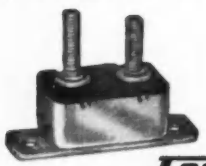
(*Turn to page* 190, *please*)

5 small parts to solve BIG PROBLEMS

Some of the smallest parts are big factors in helping a car earn and keep a good reputation.



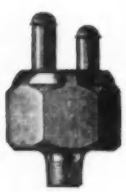
FASCO
LOW PRESSURE INDICATING SWITCH
Dependable signal of dangerous low-pressure—as in engine lubricating or air brake systems.



FASCO
AUTOMATIC RESET CIRCUIT BREAKER
Precision calibrated—Permanent protection for electrical equipment—Instant mounting.



FASCO
DIRECTIONAL SIGNAL FLASHER
Compact—Rugged—Adaptable to all circuits—Safe—Economical (no fuse needed).



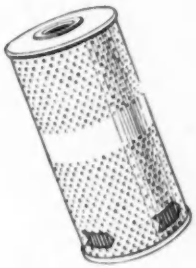
FASCO
HYDRAULIC STOPLIGHT SWITCH
Accurate—Extremely high safety factor—Proved through 26 years as standard original equipment.



FASCO
SERIES 400 PRESSURE SWITCH
Versatile (for low and medium pressure applications) — Reliable Available in many forms.

Fasco Electrical Equipment Serves the Automotive Industry

FASCO
INDUSTRIES, INC.
ROCHESTER 2, NEW YORK



1.

High full-flow rates within practical design dimensions: Purolator's famous "accordion-pleated" Micronic* filter element has up to ten times more filtering area than old-style filters—gives high flow rates in a minimum of space.

Here's why more

Original Equipment Manufacturers

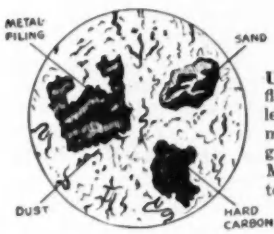
prefer Purolator filters for *full flow*

Inch for inch and pound for pound, Purolator filters can't be beat. Test after test conducted by leading internal combustion equipment manufacturers prove that Purolator filters give finer, more dependable filtration at optimum flow rates, in minimum space.

Purolators are available in hundreds of different types, for all filter applications, including air, gasoline, lube oil, fuel oil, hydraulic fluids and water. Purolator's engineering staff and research laboratories, *the world's largest,* will be glad to assist you with any filter problem you may have.

Get the latest technical information on Purolator filters. Simply mail in the coupon below.

2.



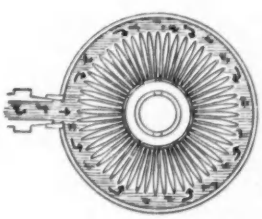
Ultra-micronic filtration: High flow rates are, of course, meaningless unless effective filtration is maintained, too. Electron micrographs prove that the Purolator Micronic filter stops particles down to *submicrons*—.0000039 in.!

3.



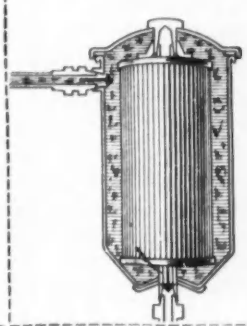
Maximum dirt storage capacity: The pleated design of the Purolator Micronic filter element provides many times more dirt storage space than old-style filters. This important advantage means uniform, efficient performance throughout a long service life.

4.



Minimum pressure drop: With its larger filtering area, the Purolator Micronic filter element introduces a remarkably small pressure drop into the lubricating system . . . permitting pumps of practical size and simple type.

5.



Will not remove or absorb additives: With Purolator Micronic filtration, you keep *all* the oil quality you pay for. The Micronic filter element will not strip additives . . . an important advantage with HD and heat-resistant oils.

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey, and Toronto, Ontario, Canada
Factory Branch Offices: Chicago, Detroit, Los Angeles

PUROLATOR
WORLD'S FINEST OIL FILTER

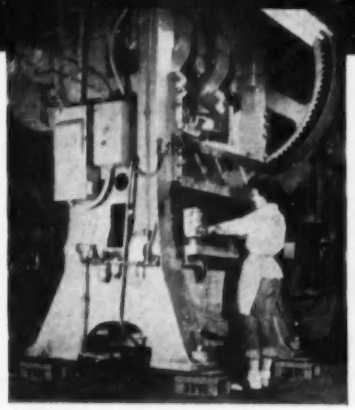
Purolator Products, Inc., Rahway, N. J.
Send the following Purolator catalogs:
☐ Industrial ☐ Aviation ☐ Automotive ☐ Fleet

Name_____ Title_____

Company_____

Address_____

For a VIBRATION-Free Press Department...



This large press creates severe shock and required complete vibration control. Korfund Steel Spring Vibro-Isolators with adjustable leveling bolts (a Korfund feature for over 30 years) so completely solve this problem that no shock can be felt in the floor even right beside the press.



One of the many smaller punch presses. Since the size and location of these presses did not require the maximum isolation efficiency provided by spring isolators, Korfund recommended mounting them on low cost VPS Elastp-Rib Dampers.

Use Korfund Isolation

These installations, at McCurdy Manufacturing Co. at Detroit, illustrate a typical Korfund Vibration Control Service.

Korfund believes one product, or even one type of product cannot solve all vibration problems *efficiently* and *economically*. Korfund makes and offers several different types — each one designed for a specific set of conditions.

When you bring your vibration problem to Korfund, you get impartial recommendations on media whether it be springs, rubber or cork, alone or in combination. Our main interest is your satisfaction.

For your free equipment isolation Selector Chart and additional data on increasing production and reducing costs, write for your copy of Bulletin 22, or see our catalog in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. A half-century of experience is at your disposal.

Bolting to floors is eliminated with Korfund Steel Spring Vibro-Isolators or VPS Elasto-Rib Dampers in most cases — yet either type mounting can be bolted if desired.

THE KORFUND CO., INC.

48-02A Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

AIRBRIEFS

(*Continued from page* 188)

and tooling for the French Turbomeca J69 Marbore turbojet engine of about 900 lb static thrust. Continental has already delivered five of the engines under a previous contract. The engines will be used in the Ryan Firebee target drone and other pilotless aircraft and is proving successful in this country because it is a low-powered unit. U. S. engine manufacturers have concentrated on ever more-powerful turbojet engines (now nearing 15,000 lb thrust) and virtually neglected the 1000-lb class of engine for which there is now developing increasing demand in the drone and missile field. Major production order for the J69 will be for the new Cessna T-37 twin-jet trainer, now undergoing development, and other executive aircraft manufacturers are investigating the economics of jet-powered civil aircraft in the 4-10-place field.

Commercial Convertiplane

Bell Aircraft Corp. is the first manufacturer to announce plans for a commercial convertiplane. Bell reveals it expects to have available in the next four years a five-place convertiplane selling for about $75,000. It will cruise at about 220 mph after making a vertical takeoff and tilting its rotors forward to become propellers. Bell also reveals an even more ambitious plan to have available in about eight years a 40-place transport convertiplane to sell for about $500,000. Market for such a machine is seen in the fact that its vertical takeoff and landing quality will permit its serving the very heart of cities, thereby saving as high as 1½ hours in ground travel time to and from airports. With this time saving, the convertiplane transport could cruise at only 250 mph in the air and still prove faster transportation than even 550-mph jet transports on certain routes.

U.S. Air Power

The United States now has 34,000 military aircraft in service, of which about one-third are jet powered, according to latest Pentagon statistics. Under current procurement programs, the nation will have 40,000 military aircraft in service by 1957, of which one-half will be jet-powered. All fighters in the Air Force are now jet powered and 80 per cent of all USAF combat wings are jet equipped.

NEW! SOCKETLESS FITTINGS

make hose like replacement assembly easy . . . economy price!



Just Push Them On!
. . . They'll Stay On!

Imagine making Aeroquip hose assemblies by just *pushing* socketless fittings into the hose! Hand pressure does it, and the fittings stay on for keeps thanks to unique design features.

With no socket, Aeroquip socketless fittings are the last word in one-piece simplicity. They are specifically designed to work with Aeroquip 1525 triple-ply, cotton-reinforced hose.

A small inventory of bulk stock makes fuel, air, water, and oil lines using medium pressures. There is no waste or dead inventory. Sizes available are ¼, ⅜, ½, and ⅝". For more information call your Aeroquip distributor or write us direct.



Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: Burbank, Calif. • Dayton, Ohio • Hagerstown, Md. • High Point, N. C. • Miami Springs, Fla. • Minneapolis, Minn. Portland, Ore. • Van Wert, Ohio • Wichita, Kan. • **IN CANADA:** Preco Progress and Engineering Corporation Ltd., Toronto

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Industry News

(*Continued from page* 40)

Further Details Disclosed On Ford-Simca Operation

Under the recent link-up with Simca (see AUTOMOTIVE INDUSTRIES, Aug. 1, pg. 38), French Ford will continue the production of the Vedette and the Vendome passenger cars, as well as the Comet and Comet Ford Monte-Carlo, the Abeille utility, and the Cargo truck. The name Ford reportedly will disappear from the Poissy factory and be replaced by Simca.

Close technical contact will be maintained with Detroit, and the American company will have an important holding in the Ford-Simca combine. Leading French dealers for Ford will continue to function as in the past and will give service to British, German, and American Ford owners.



Chrysler Can Reactivate Standby Plant Overnight

The more than 2000 machines at the Chrysler-managed Michaud Ordnance plant in New Orleans, which was put on a "standby basis" earlier this year, can be put into operation almost overnight for volume production of tank engines.

Described as one of the most modern engine manufacturing facilities in the world, and regarded as the largest standby defense plant in the country, the plant has maintained a permanent work force of 115. To keep the plant in best operating condition in the event of emergency, Chrysler personnel had to be schooled in standby processes at the Army's underground storage facilities in Kansas.

When it was turning out 810-hp Continental tank engines in volume from June, 1951, to March, 1954, the New Orleans plant had a peak employment of 2350 persons. Today the two million sq ft facility is kept in almost the same excellent operating condition as it was when it was rolling out thousands of tank engines.

Test cells, equipment and various intricate instruments can be reactivated within a matter of days. Each machine is cleaned and oiled regularly, and any defective parts are repaired or replaced. All machines, conveyors, hoists, hydraulic lifts, and electric motors are run periodically.

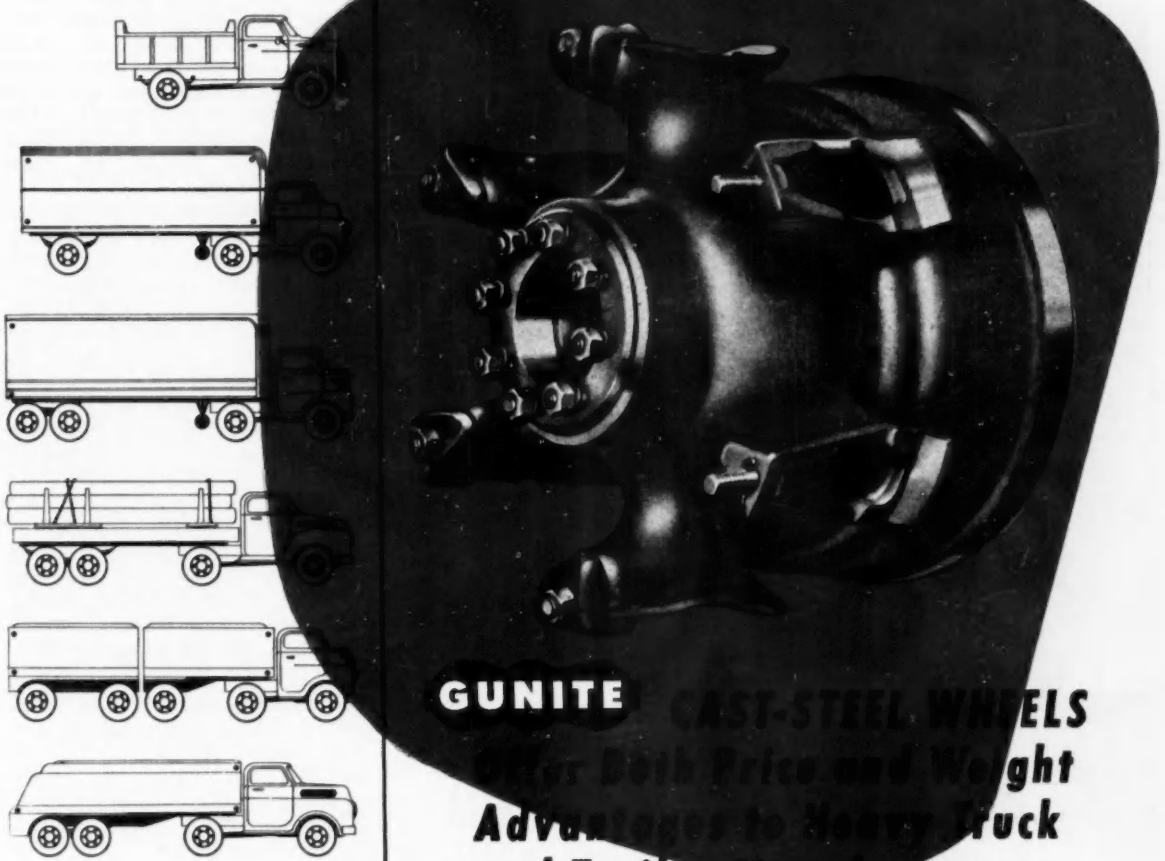
Highly-specialized laboratory equipment, including some 18,000 gages and precision tools which are not being used, have been dipped in a plastic substance which hardens and gives protection against rust.

One of the biggest projects designed to keep heavier equipment inside the plant from rusting is continuous dehumidifying. This is accomplished by pumping steam-heated air into the manufacturing area to maintain a constant temperature of 90 F to hold relative humidity below 50 per cent. The company is now installing a 9900-ton dehumidification system designed to achieve the same results at 80 F.

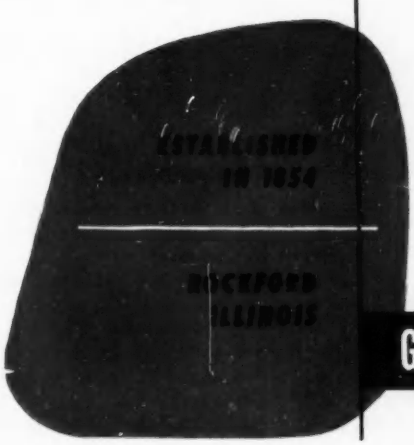
In contrast to the rapid conversion that could be achieved at the plant under its standby system, it would take three to four months to reactivate the plant had it been "mothballed," as many other defense plants have been by the Government. Machines would have to be coated with heavy grease, dusted with corrosion inhibitor crystals and encased in a cocoon of wire mesh, anticorrosion paper and a gelatin substance to seal them from the air.

(*Turn to page* 194, *please*)

GUNITE WHEELS MAKE GOOD TRUCKS BETTER



GUNITE CAST-STEEL WHEELS
Offer Both Price and Weight
Advantages to Heavy Truck
and Trailer Manufacturers



Many engineers are specifying Gunite Cast-Steel Wheel Assemblies on their heavier trucks and trailers. They gain all these advantages:

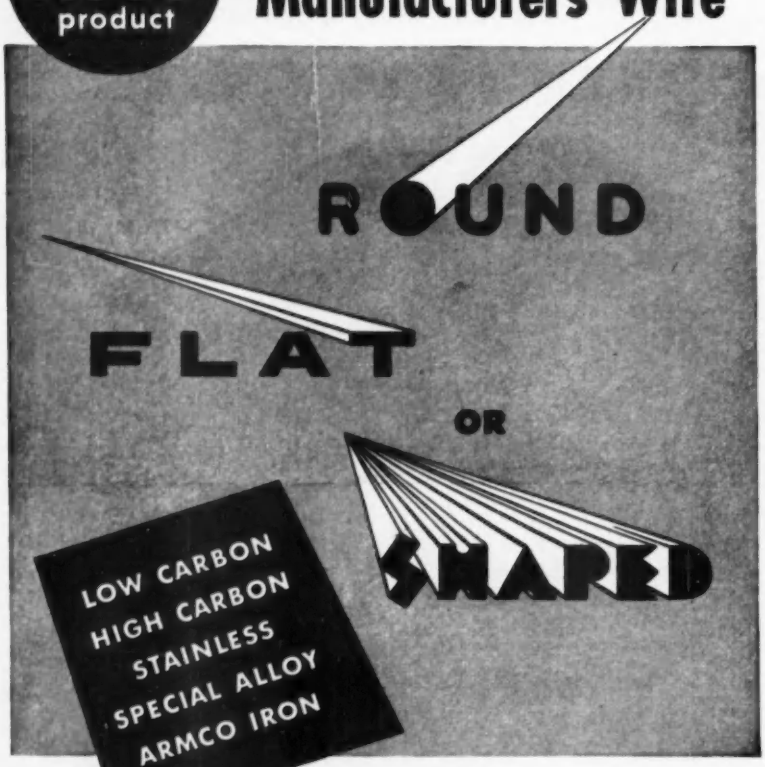
1. Minimum weight with maximum strength
2. Better appearance
3. Floating rim bolt for easy replacement
4. Increased safety of famous Gunite Brake Drum
5. Greater air-cooling over brake drums
6. Easier Assembly . . . less weight to handle

Write for Complete Engineering Data

GUNITE FOUNDRIES CORPORATION

an ACCO product

PAGE
Manufacturers' Wire



PAGE makes them all

YOU draw the Shape...
PAGE will draw the Wire

Cross-sectional areas up to .250" square; widths up to ⅜"; width-to-thickness ratio not to exceed 6 to 1.

Tell us the way you want it. We'll follow your specifications.

Write or wire today

ACCO
Page Steel and Wire Division
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Bridgeport, Conn.

plus Welding Electrodes Wires Rods

Industry News

(*Continued from page* 192)

Two Contracts Are Awarded To Continental for J-69

Two separate contracts totaling $4 million have been granted to Continental Aviation and Engineering Corp. for the manufacture of J-69 turbojet engines. One is a $2 million follow-up production order for the engine and the other, for the same amount, covers production facilities for the engine, which Cessna Aircraft Co. is under contract to build.

Production tooling, and manufacture of the first five production engines, were covered in an Air Force contract issued earlier this year. The same basic engine is used in the Firebee target drone, which Ryan Aeronautical Co. is building under Air Force contract.

Parts for the engine will be turned ou tby Continental at its four plants in Muskegon, Mich., and Detroit. A pilot assembly line is presently being installed at the company's new plant in Detroit, where the engine will be assembled and tested.

Nash, Hudson Move Ahead In Linking Operations

Hudson has clarified details of the consolidation of its Service Dept. activities with those of Nash. All technical service information for both divisions will be handled by a Technical Service Div. set up by American Motors at Milwaukee.

As products of the two divisions become more integrated, much of the service information will be common to both makes. However, an important distinction is that both Nash and Hudson will maintain their own field personnel to conduct service training among dealers. Both also will handle merchandising of parts and accessories individually.

American Motors Skips Dividend

Newly formed American Motors Corp. has decided to skip its second dividend. The company feels that it will remain in a better position by conserving its working capital in its effort to strengthen itself in the highly competitive automobile industry. The corporation issued an initial dividend of 12½ cents last June.

(*Turn to page* 196, *please*)

New Harvey aluminum alloy 66S will reduce your costs

high-strength-low-cost-ratio

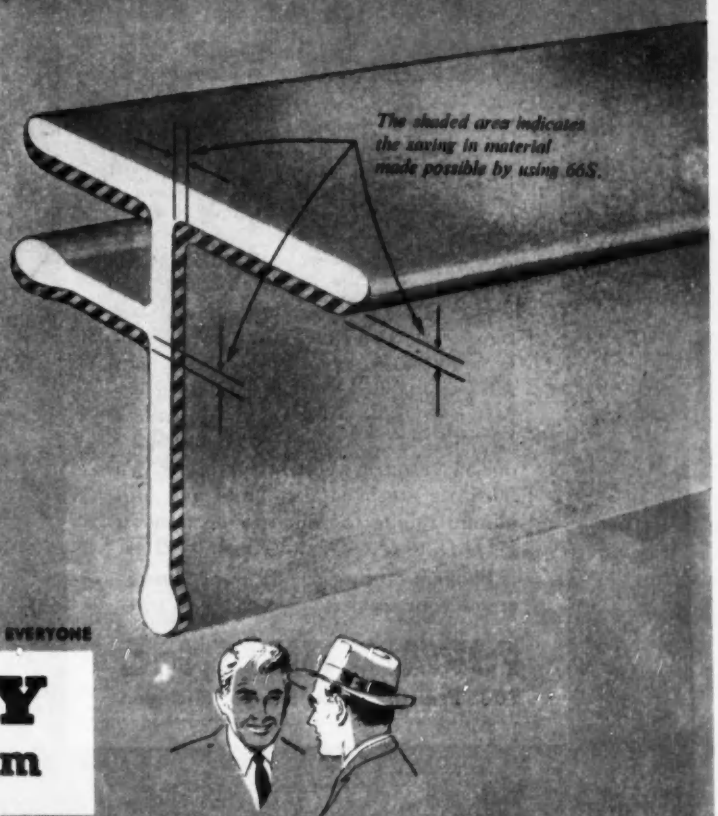
means that Harvey metallurgists have combined the essential qualities of many ideal structural alloys into a single new aluminum alloy—66S. This general purpose alloy is bringing real economy to many industries. It combines the high strength of 24S and the good corrosion resistance, weldability and economy of 61S.

Alert aluminum fabricators can now use 66S to reduce material costs, cut weight without sacrificing strength, and lower fabricating costs. You can reduce your costs at Harvey Aluminum . . . tooling service charges are nominal, and Harvey prepays the freight to your dock. Send for your Bulletin on 66S today.



here's how you save

The high yield strength of 66S permits you to reduce the cross section of structural members. This means real dollar savings in material costs. The extrusion below was made of 61S. By using the high yield strength of 66S its cross section is reduced as shown. The saving in material amounts to approximately 26%. Saving in cost, 21%.



MAKING THE MOST OF ALUMINUM—FOR EVERYONE

HARVEY Aluminum

HARVEY ALUMINUM SALES, INC.
TORRANCE—LOS ANGELES, CALIFORNIA
BRANCH OFFICES IN PRINCIPAL CITIES

The men at Harvey Aluminum are dedicated to the idea of improving your product while reducing your costs. And remember, we prepay the freight to your plant.

An independent producer of aluminum extrusions in all alloys and all sizes; special extrusions, press forgings, bar stock, forging stock, tubes, impact extrusions, aluminum screw machine products and related products.

Industry News

(*Continued from page* 194)

Two Large Vehicle Shows To Be Held in Britain

Britain's two largest international motor shows are scheduled for September and October at Earls Court, London. The Commercial Motor Transport Exhibition opens on Sept. 24 and closes Oct. 2, while the Motor Show will be held from Oct. 20 to 30.

The Motor Show will display British and foreign private automobiles, special body work, trailers, accessories, components, transport service equipment, and tires. Motor boats and marine engines will also be exhibited.

The Commercial Show will cover commercial and special purpose vehicles, together with all types of tools, accessories, and transport service equipment. Examples of new developments and progress made in the industry will be shown.



Lunn Laminates Set to Expand Its Automotive Activities

Lunn Laminates, Inc., is planning a million-dollar expansion program which would channel future activities into the automotive field on a much broader scope. The company is now concluding negotiations for the acquisition of several name companies within the reinforced plastics industry.

Future plans are said to include:

1) Concentration on truck, cab and truck structure manufacture.
2) Proprietary manufacture of truck body kits for local shops.
3) Entry into the tool and die field.
4) Construction of a modern press molding plant.

The company states that it has completed additional research and now will expand its work in the automobile and truck fields by adding and also acquiring new facilities for making tool and dies. Lunn claims that it will set a precedent in the industry since, for the first time, all types of hard dies—plastics, steel and combination plastics-steel—will be made available to the automotive and other industries from one maker.

Factory Vehicle Sales Off About 500,000 Units

Latest available figures show that factory sales of motor vehicles for the first seven months of this year were down about 500,000 units under the comparable period last year. Total sales amounted to 4,067,905, against 4,574,946 units in the like 1953 period.

The 1954 figure included 3,423,214 cars, 642,411 trucks, and 2280 coaches. In the same seven months last year there were 3,830,638 cars sold, 742,360 trucks, and 1948 coaches.

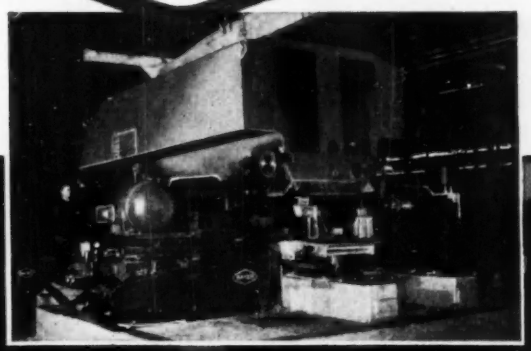
Export sales were still running at about six per cent of total sales, against 4.6 last year. There were 243,386 vehicles exported in the first seven months of this year, compared with 208,364 for the same period last year.

Eight Sessions on Aircraft Set for AIEE Fall Meeting

Wide attention will be paid to electrical aspects of the aviation industry during the Fall General Meeting of the American Institute of Electrical Engineers in Chicago, Oct. 11 to 15. Eight sessions will be devoted to this important phase of the electrical engineering profession.

(*Turn to page* 198, *please*)

New BAKER Automatic MACHINES 15,000 lb. TANK HULL as it passes along 100 FOOT RAILS!



OPERATIONS: DRILLING . . . TAPPING . . . BORING . . . FACING on 102 holes . . . 10 main bores Mounted on a specially-built floating concrete slab, this huge new Automatic Baker Transfer Machine accurately performs multiple drilling, tapping, boring and facing operations on 15,000 pound rough weldments 9 feet wide and 16 feet long. Savings achieved in production costs with a machine of this type are tremendous. Baker engineering know-how stands ready to solve your production problems . . . with cost cutting standard or special, single or multi-operation machines.

Write regarding your specific job problems . . .

BAKER BROTHERS, INC. Toledo, Ohio
DRILLING . . . TAPPING . . . KEYSEATING and CONTOUR GRINDING MACHINES



Here's More Technical Aid In Selection And Design Of Your Fasteners And Parts

Townsend has expanded its Technical Sales Department to help you in your constant effort to improve your product, reduce unit costs and speed assembly. Here, a group of specialists works as a unit to devise the most economical and efficient methods of product assembly for all industry.

These men can serve you in several ways. They will visit your plant as fastening consultants to your design engineers and operating men. They will analyze a particular product and design special parts for it or suggest use of standard products in the assembly.

You may want them to study your entire production line for improved assembly techniques—they will even design a single part to solve a specific problem.

Another way to obtain the services of this department is to send drawings and samples of specific items for suggestions as to how they can be produced more economically.

Back of the Technical Sales Department is a company with nearly a century and a half of wire drawing and cold-forming experience. More than 10,000 standard and special parts and fasteners are produced regularly by Townsend.

In addition to the wide range of products and design experience at your command, Townsend has the tremendous capacity to produce 60-million pieces a day. This means you can depend upon Townsend to keep pace with your production lines since, in its several plants, there are enough machines of any type to handle a variety of long production runs simultaneously.

To learn how you may effect substantial savings in material costs, speed production and improve your product, write today for illustrated bulletin or use the coupon below.

THE FASTENING AUTHORITY

Townsend

COMPANY • ESTABLISHED 1816

Sales Offices in Principal Cities

In Canada: *Parmenter & Bullock Manufacturing Company, Ltd., Gananoque, Ontario*

TOWNSEND COMPANY
Sales Department
New Brighton, Pa.

Please send Technical Sales Department Bulletin TL-98.

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State_____

Industry News

(Continued from page 196)

L. A. Young Purchases Daybrook Hydraulic

As part of its diversification program, L. A. Young Spring & Wire Corp., Detroit, has purchased Daybrook Hydraulic Corp. of Bowling Green, O. The latter will operate as the Daybrook Hydraulic Div. of L. A. Young.

Present plans include a new national program of distribution and expansion of products. Power gates, which Daybrook has been producing at its two plants in Bowling Green and Sandusky, O., will receive particular attention. In addition to end gates for trucks and trailers, Daybrook has been manufacturing dump bodies ranging in capacity from 1½ to 25 tons and hydraulic hoists. L. A. Young, which has 14 plants located throughout the country, produces springs and wire for the automotive and other industries.

ASME-ASLE to Present Lubrication Conclave

The American Society of Mechanical Engineers and the American Society of Lubrication Engineers have joined forces to present the most recent developments in the field of lubrication at their First Annual ASME-ASLE Lubrication Conference. Nineteen papers will be given in five sessions covering the current problems encountered, and the progress that has been made in lubrication engineering.

This meeting will take place Oct. 18 and 19, 1954, at the Lord Baltimore Hotel in Baltimore, Md. Complete programs are available from the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Building Program Proceeds At Ford Research Center

Ford Motor Co. has started construction of an addition to the Dynamometer building at its Research and Engineering Center in Dearborn, Mich.

The new wing will cover 46,400 sq ft and have 30 engine test cells.

Upon completion in 1956, the entire dynamometer test facility will cover an area of about 294,000 sq ft and include 67 test rooms. Its principal

section was erected in 1952 as the first major unit of the huge center.

Since 1952, four other units to house Ford's Engineering Staff activities have been erected in the Research and Engineering Center—the Styling building, Pilot Gas Turbine Laboratory, Maintenance building, and Vehicles Testing building "A".

Work also is under way on an Engineering Staff Industrial Relations building, — scheduled for completion this month. Ground will be broken this fall for three new structures—Body Engineering building, Scientific Laboratory, and Research building and a Cafeteria.

Kaiser-Willys "Big Top" Starts Touring Country

First displayed in Ionia, Mich., last month, Kaiser-Willys' $100,000 exhibit which features the Jeep and its companion vehicles, is slated for more than 20 major fairs throughout the country this fall and winter. In circus atmosphere, the exhibition will feature the Jeep utility line in action outside a huge tent, and a salon-type show inside the "big top" displaying the complete K-W passenger car line.

AC Vacuum Pump Adopted By Other Car Makers

Several car manufacturers reportedly will use AC Spark Plug's rotary vacuum pump on their 1955 models. The pump was used for the first time on 1954 Cadillacs.

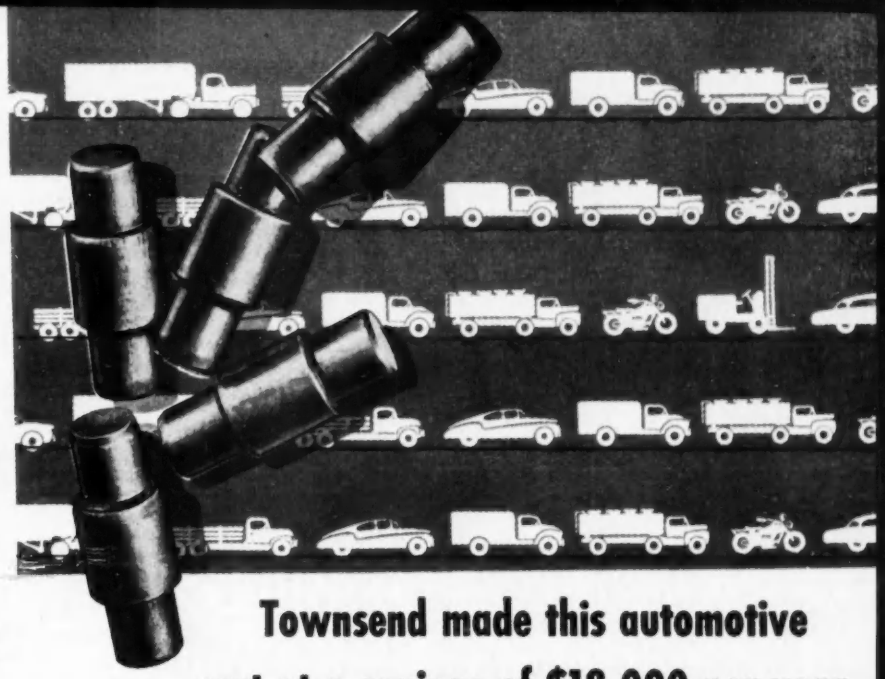
Advantage of the AC pump over other types of units, it is claimed, is that it creates a high static vacuum that operates the windshield wiper blades of an automobile under practically all road conditions. The AC unit is a vane-type positive pump, and can be driven by any rotating part.

Vehicle Registrations Rise Sharply in Mexican Capital

Motor vehicles operating in Mexico City have risen by 300 per cent in the last 20 years, according to the Bureau of Transit. Registration records show a total 161,426 vehicles in use today.

Breakdown of figures reveals that private cars total to 89,552, taxis, 7,013; Government vehicles, 4,076 this year, school buses, 747; passenger buses, 6,158; and private trucks, 18,576 units; Government trucks, including military, 2,456.

(*Turn to page* 200, *please*)



Townsend made this automotive part at a savings of $18,000 per year

Big savings turn up in unexpected places when you examine the cost of producing small parts and fasteners. That's what happened when a Townsend engineer suggested that this small spacer stud could be produced by the Townsend method of cold-forming at one-third the cost of the former method. Result —a cool $18,000 clipped from production costs and a tougher, stronger part.

This is possible because the Townsend method is fast. And all the raw material went into the part, none was cut away as scrap. As a result, more pieces per pound of metal were produced, resulting in additional economy.

Townsend parts have high resistance to shock and fatigue because cold-forming increases tensile strength. The flow lines of the metal follow the contours of the piece instead of remaining in a single plane, as with machined parts. Cold-forming strengthens the threads and eliminates stock notching. Close size tolerances and excellent surface finish are characteristic of Townsend parts.

As "The Fastening Authority," Townsend produces 60-million pieces daily—regularly makes more than 10,000 special and standard fasteners and parts. With this capacity and the experience of 138 years of metal working to draw upon, Townsend engineers will help you reduce your material and assembly costs. Ask to have one of them call. For more information use the coupon below or write for illustrated bulletin.

Townsend
COMPANY • ESTABLISHED 1816
NEW BRIGHTON, PENNSYLVANIA
Sales Offices in Principal Cities
Cherry River Division • Santa Ana, California

In Canada: *Parmenter & Bulloch Manufacturing Company, Ltd., Gananoque, Ontario*

TOWNSEND COMPANY
Sales Department
New Brighton, Pa.

Please send without obligation "Special Cold-Formed Fasteners and Small Parts" Bulletin TL-89.

Name_____ Title_____
Company_____
Street_____
City_____ Zone_____ State_____

Industry News

(*Continued from page* 199)

GE Undertakes Expansion Of Research Facilities

As part of its multimillion dollar expansion plan for its research laboratory, General Electric Co. will employ between 400 and 500 additional permanent employes. Costs of new construction and equipment is expected to total somewhere around $13 million, the company anticipates.

Work is expected to begin soon on a new five-story south wing addition to the main laboratory. Steel for two additional stories above the present three-story east office wing is already being delivered.

One new building, nearly finished, is a $3.7 million laboratory and shop-type structure for the development of metallurgy and ceramic materials and their processing. Another, to cost well over $1.8 million, will enable scientists to conduct various experiments.

Open new possibilities in production design with

SURF-KOTE

solid lubricant ®

gives longer wear in difficult lubricating applications

SURF-KOTE solves problems of lubrication at extreme temperature and pressure ranges, lubrication of inaccessible bearings and of parts where dust accumulates. Forming a hard, unbroken film that prevents contact between metal surfaces, SURF-KOTE also provides dependable resistance to oils, greases, solvents, acids and alkalis.

SURF-KOTE surface bonded lubricants are suspensions of modified molybdenum disulphide in various types of resinous binders. They are formulated to meet exacting demands, compounded under close control.

EASY TO APPLY. SURF-KOTE compounds can be applied to a variety of metallic surfaces including: ferrous alloys, stainless steels, aluminum, brass, bronze, magnesium, titanium, cadmium and zinc. They are thinned by solvent and applied by spraying, dipping or brushing, then dried and baked, requiring only the equipment generally available in paint and enamel departments.



Parts may be processed in your own plant or by us. Drop us a card today for a copy of the SURF-KOTE illustrated folder; also SURF-KOTE Surface Preparation and Application Specification Sheets.

HOHMAN PLATING & MFG., INC.

905 East Third Street • Dayton 2, Ohio

MESA May Join Hands With CIO

The Mechanics Educational Society of America, which has always handled its own union problems since it was organized 21 years ago, is considering joining up with the CIO. The 46,000 member organization reportedly has been offered an autonomous charter by the CIO and is expected to make a final decision in New York Sept. 19 when its 150-member administrative committee will meet.

Formed 21 years ago, the MESA at first represented only tool and die workers but later changed to an industrial union. If it accepts the CIO's charter, all that will be required to complete the merger is the clearing up of jurisdictional questions.

Quality Control Group Plans Special Exhibit

A special conference designed to acquaint its Los Angeles members with the latest equipment will be sponsored by the American Society for Quality Control next March in Los Angeles. It will be held concurrently with the first Western Industrial Exposition and national convention of the American Society of Tool Engineers in the Shrine Auditorium and Exposition Hall.

New Car Distribution Plan Announced by Ford Division

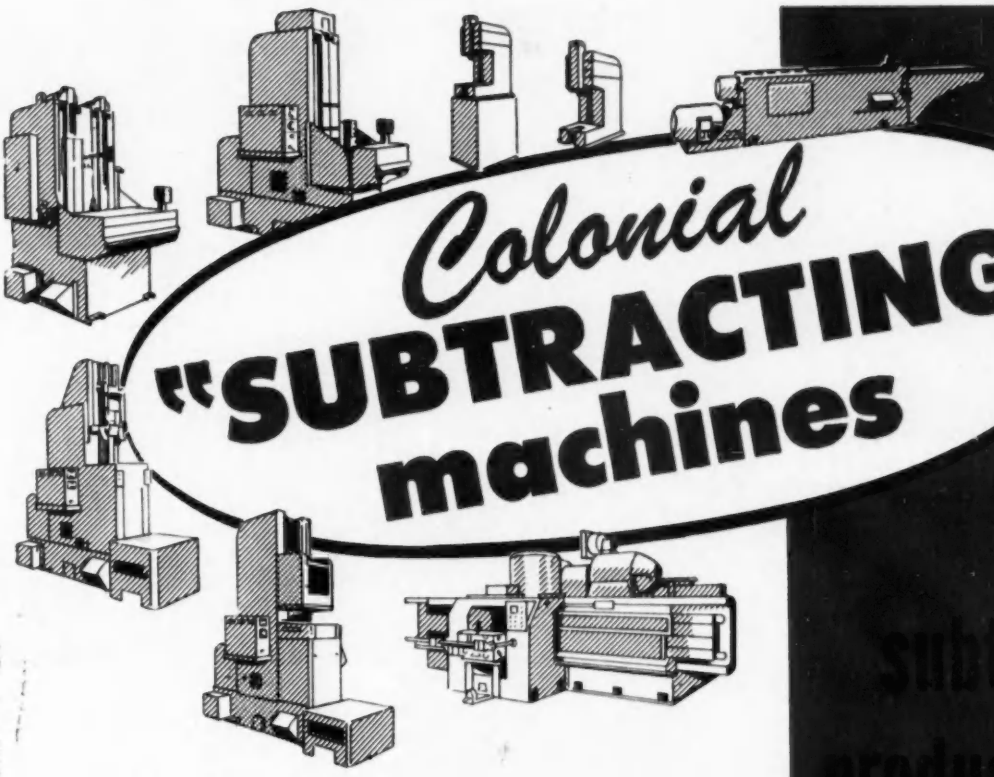
Ford Div. of Ford Motor Co. has started a new vehicle distribution program designed to reduce delivery time in instances where a customer desires a vehicle not available from the dealer's stocks.

Under the new program, a direct line of communications has been established between the district sales office and the assembly plant. Previously, each district sales office submitted its schedules to the district sales office in the assembly plant town.

Lear To Spend $15 Million On New Expansion Program

A $15 million expansion program, which will include a new factory in Grand Rapids, Mich., has been announced by Lear, Inc., manufacturer of airplane parts. The Grand Rapids plant will cost about $3 million and is expected to be built in the next two years. It would replace the company's present facilities in that city.

(*Turn to page* 203, *please*)



Colonial "SUBTRACTING" machines

they subtract production costs . . . add to profits

Subtraction #1—the *Broach.* With the Colonial broach designed specifically to broach the part efficiently to the tolerances specified at the required rate of production, cost subtraction starts.

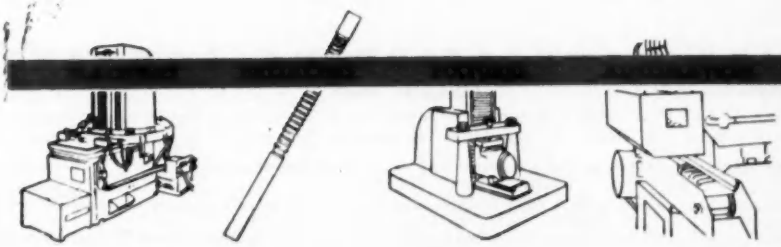
Subtraction #2—the *Machine.* Selecting one of the more than 60 dependable Colonial broaching machines capable of handling the broach at the specified rate of production is the next important step in subtracting costs.

Subtraction #3—the *Fixture.* The Colonial fixture, locating and clamping the part in broaching position, while at the same time permitting maximum accessibility for loading and unloading, is another important step in cost subtraction.

Subtraction #4—the *Automation.* Where high production requirements make loading and unloading time an important factor, the Colonial automation of the broaching installation will serve to further subtract machining costs.

ADDITION—By adding the four important Colonial cost subtracting features above, today's cost conscious metalworking plant has a complete *Colonial Unified Broaching Installation* capable of producing the part at lowest possible cost with utmost accuracy. To subtract costs and add to profits in your plant, ask Colonial Broach to quote on Unified Broaching installations for your parts.

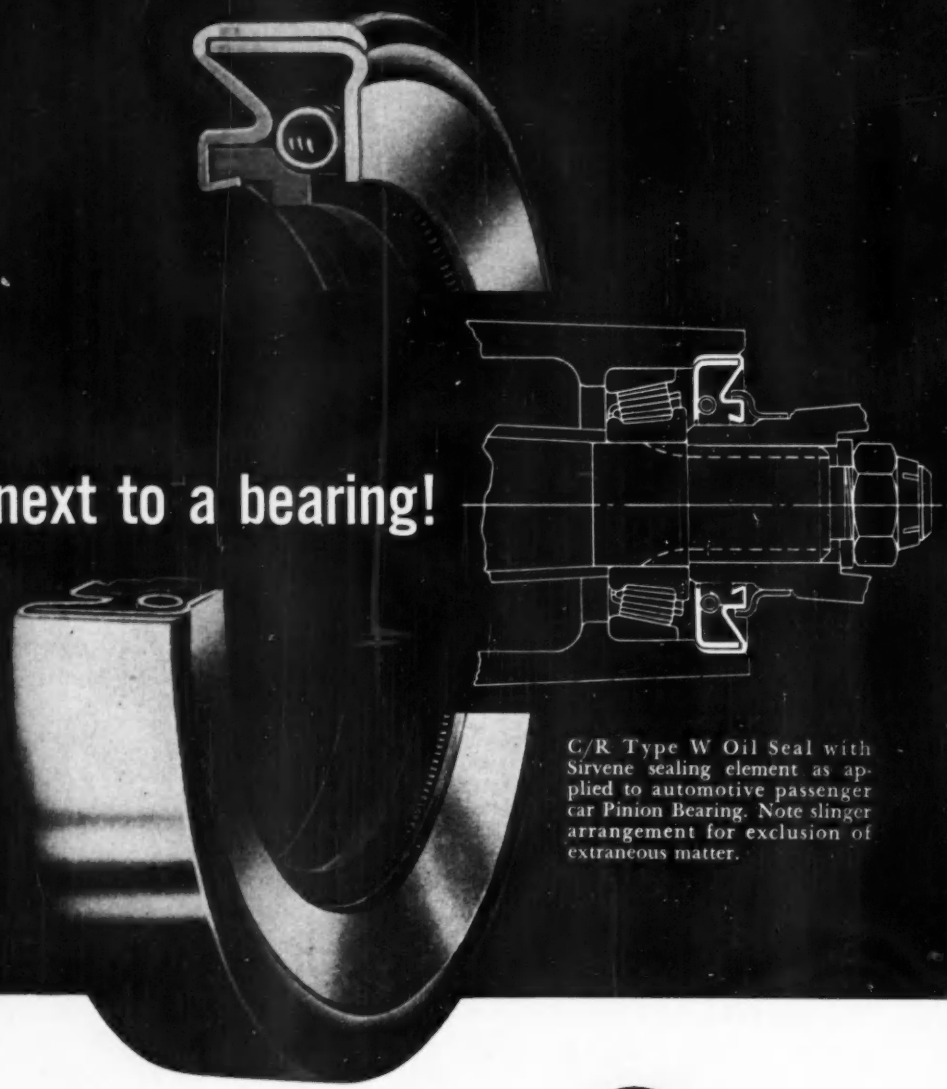
Ask for bulletin 877 on complete line of Colonial broaching machines



Unified Broaching

COLONIAL

Best thing next to a bearing!



C/R Type W Oil Seal with Sirvene sealing element as applied to automotive passenger car Pinion Bearing. Note slinger arrangement for exclusion of extraneous matter.

EXPERIENCE MAKES THE DIFFERENCE

Chicago Rawhide brings the world's widest experience to any oil sealing problem . . . and unequalled resources of research, engineering and production. C/R's specialized sealing materials include Sirvene synthetic rubber . . . Sirvis mechanical leather . . . and the new **Conpor** leather (which gives complete lubricant control). Each of these materials offers special advantages for a wide range of applications under varying operating conditions. Chicago Rawhide engineers will be glad to work with you in developing the right material for your problem and cooperate on special designs. Or, you may be able to select the right C/R seal from 17 standard types and more than 1800 sizes. Write us, if you would like a copy of "C/R Perfect Oil Seals".

C/R

PERFECT

Oil Seals

More automobiles, farm and industrial machines rely on C/R Oil Seals than on any similar sealing device

CHICAGO RAWHIDE MANUFACTURING COMPANY

1310 Elston Avenue OIL SEAL DIVISION Chicago 22, Illinois

Representatives in these Principal Cities: Boston • New York • Syracuse • Buffalo • Philadelphia • Pittsburgh • Cincinnati • Cleveland Detroit • Peoria • Minneapolis • Wichita • Tulsa • Houston • Los Angeles • San Francisco • Seattle • Spokane • Portland

MANUFACTURED AND DISTRIBUTED IN CANADA BY SUPER OIL SEAL MFG. CO., LTD., HAMILTON, ONT.

Other **C/R** *products*

SIRVENE: (Synthetic rubber) diaphragms, boots, gaskets and similar parts for critical operating conditions • CONPOR: Controlled porosity mechanical leather packings and other sealing products • SIRVIS: Mechanical leather boots, gaskets, packings and related products.

Industry News

(Continued from page 200)

Chrysler Pushes Automatic Transmissions For Taxicabs

Fargo Div. of Chrysler Corp., which supplies fleets to commercial users, hopes to interest more taxicab companies in automatic transmissions. The percentage of no-shift units on cabs so far has been relatively small because most companies felt they presented too many maintenance problems.

However, cab companies have shown new interest lately in such transmissions. Several reportedly have installed the units on their vehicles on an experimental basis. Plymouth, which turns out most of the Chrysler Corp. cabs, is especially encouraging cab companies.

West Coast Aircraft Industry Includes Mammoth Facilities

Aircraft manufacturers on the West Coast now have a backlog of $5.75 billion. Roughly 50 per cent of the nation's aircraft is produced in California and Washington.

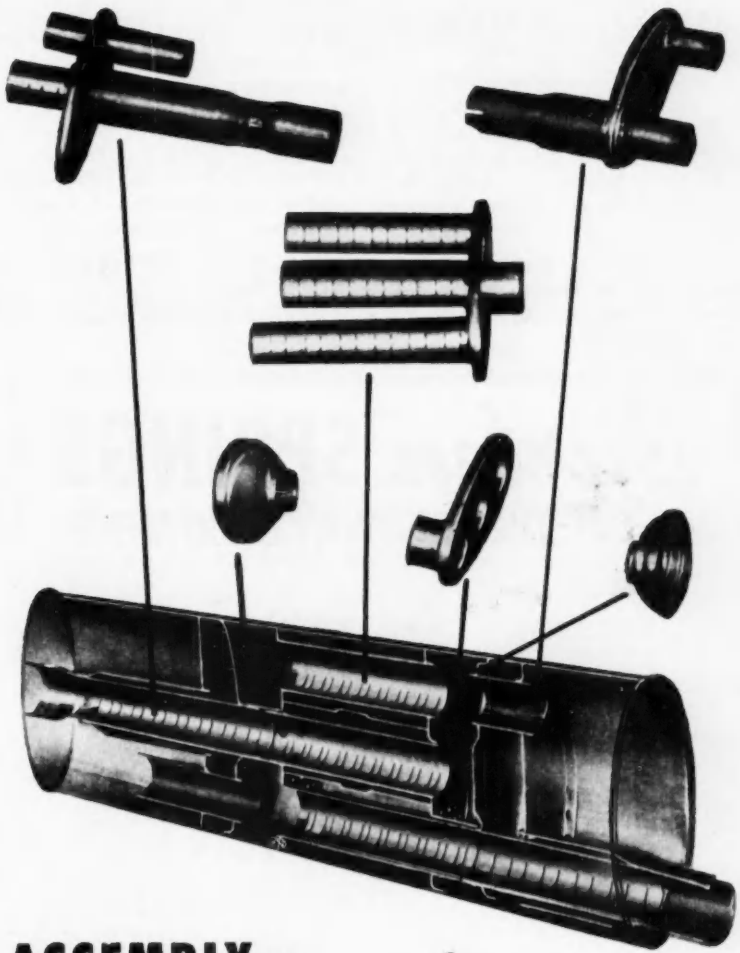
Aircraft employment on the West Coast is reported to be 32.4 per cent of the U. S. total. Latest figures reveal the following breakdown: Los Angeles metropolitan area, 176,800 workers; San Diego, 36,000; San Francisco-Oakland, 3700; balance of California, 7800, and Seattle, 37,000. The industry pays out $24 million in its weekly payroll.

Manufacturing area is now nearly 47 million sq ft in the West Coast states. More than 75 million sq ft scattered throughout the nation are presently in use by these companies.

Young Car Designers Win $20,000 In Scholarships

Eight youthful car designers won $20,000 in scholarships awarded in the annual Fisher Body Craftsman's Guild model car competition. Top winner in the senior division was Gary Graham, 19, of Bellingham, Wash., whose sports car won for him a $4000 scholarship.

In the junior division, a fashionable coupe model also garnered James C. Fry, 15, of Clinton, Ill., a $4000 scholarship. Since the competition was started more than $420,000 has been awarded in scholarships by Fisher Body.



ASSEMBLY--
WELDING TIME 6 SECONDS!

Six individual baffle assemblies are inserted into muffler shell, accurately positioned and securely welded. Total elapsed time for completed job is an amazing six seconds.

In this short interval 96 spot welds are made — 16 welds each to the six baffle assemblies.

This Federal welder replaced several individual spot welders, eliminated a great amount of handling and boosted production by some 200 per cent.

It's the type of thing Federal engineers have been doing consistently for some of America's leading fabricators. Why not talk over your welding operation with a Federal man. There's no obligation and chances are he can show you how to reduce your production costs. It's the big reason why **Federal stays — "First in Resistance Welding."**

Federal WELDERS ®
Warco PRESSES ®

THE FEDERAL MACHINE and WELDER COMPANY
WARREN, OHIO

MEN *in the* NEWS

(*Continued from page* 41)

General Electric Co., Aeronautics & Ordnance System Div.—**Kenneth K. Bowman** has been named manager of engineering for the Guided Missiles Dept.

Twin Coach Co., Buffalo Aircraft Div.—**Stuart N. Smith** has become works manager.

Continental Screw Co.—**Raymond J. Dever** has been made sales representative for New Jersey and parts of the metropolitan New York area; **Leonard A. Ashworth**, remainder of the metropolitan New York City area, in addition to the state of Connecticut; and **Henry J. Purrington**, the western part of Massachusetts and a portion of eastern New York state.

Hudson Motors of Canada, Ltd. —**C. R. Gall** has been made general manager.



Ohio Crankshaft Co., Tocco Div.—L. C. Schweitzer is now assistant general manager.

Wagner Electric Corp., Automotive Div.—**W. P. Dutrow** was selected assistant branch manager for the New York branch office and **R. A. Fulghum**, branch manager of the Omaha, Neb., branch.

Trailmobile Inc.—**William H. French** has been appointed director of purchases.

Babcock & Wilcox Co., Boiler Div.—**E. B. Severs** is now development engineer in the Erection Dept.

Delco-Remy Div., General Motors Corp.—**J. H. Bolles** has been named director of sales and engineering; **A. G. Phelps**, executive assistant to the general manager; **P. F. Bardsley**, manager of sales and service; **Herman H. Hartzell**, divisional chief engineer; **John D. Baker**, assistant sales manager; and **P. W. House**, assistant chief engineer.

Amplex Div., Chrysler Corp.—**E. J. Stoner** has been appointed comptroller.

Chrysler Corp., Automotive Body Div.—**Harold S. Gill** was named director of employment.

R. M. Hollingshead Corp., Automotive Sales Div.—**Maurice F. Roche** was made western regional manager.

Wales-Strippit Corp., Research & Hydra Spring Divs.—**Paul H. Taylor** was elected vice-president.

Eaton Mfg. Co., Aircraft Div.—**J. C. Sprague** is now engineering manager, and **H. M. Reigner** was named sales manager.

Stanley Aviation Corp.—**Richard H. Frost** was made vice-president, and **Jerome L. Ryan** was chosen treasurer.

Clayton Manufacturing Co.—**William O. Merritt** has rejoined the firm as sales promotion and advertising manager.

Westinghouse Electric Corp., Aviation Gas Turbine Div.—**Romus Soucek** has been appointed sales manager of the new Sales and Service Dept., and **Raymond B. Rogers** is his assistant.

Ethyl Corp.—**Waldemar J. Distler** has been promoted to assistant manager of sales operations.

(*Turn to page* 206, *please*)

Burton SPRINGS
on OFF-THE-HIGHWAY EQUIPMENT



Burton Leaf Springs, installed on the heaviest motor transports by such manufacturers as The Dart Truck Company, are counted upon to give first-rate performance. These springs must prove in the field that they can withstand the rigors of rough terrain and heavy loads.

Burton is the choice of major manufacturers because they know Burton's experience and record. Burton has grown with the automotive transport industry, is familiar with its needs and maintains exacting product standards. Its engineers strive constantly to uphold and improve the efficiency of the springs that support the rolling stock of the nation, both on and off the highways.

For your individual spring problem, consult with our engineers today.

Put the Burden on Burt Basco



Burton AUTO SPRING CORP.
48th ST. at WESTERN AVE.
Chicago 32, Illinois



Because contractors measure fast, sure starts in dollars...

P&H uses GLOBE batteries

. . . it's added evidence that Globe batteries help insure better starting for automotive equipment

A reputation for quick starting adds considerably to overall sales appeal of petroleum-powered equipment.

This Harnischfeger P&H 955-A crawler-crane with lifting capacities up to 70 tons uses a Globe battery. As a result, it enjoys a reputation for fast, sure starting that owners can actually measure in terms of increased output or profits.

Globe-built batteries for automotive equipment feature many of the same design and construction advantages. For the equipment you produce and sell specify Globe and be sure.

GLOBE-UNION INC.

FOR FAST SERVICE, THERE ARE 15 GLOBE BATTERY PLANTS — ATLANTA, GEORGIA • BOSTON, MASS. • CINCINNATI, OHIO • DALLAS, TEXAS • EMPORIA, KANSAS • HASTINGS-ON-HUDSON, NEW YORK • HOUSTON, TEXAS • LOS ANGELES, CALIFORNIA • MEMPHIS, TENN. • MILWAUKEE, WISCONSIN • MINERAL RIDGE, OHIO • OREGON CITY, OREGON • PHILADELPHIA, PENNSYLVANIA • REIDSVILLE, NORTH CAROLINA • AJAX (TORONTO) CANADA.

IF IT'S PETROLEUM-POWERED *there's a Globe-built battery . . right from the start*

CROWD! HOIST! SWING!

Crowd, hoist, swing — *crowd*, hoist, swing — millions of times a day on jobs in construction, mining, and materials handling, rugged shovels slam the horsepower of powerful engines through hard-working clutches. Jobs like this call for tough, precision clutches, built to withstand loads *beyond* rated capacities. That's why more shovel builders and buyers *standardize* on Twin Disc "E" and "EH" Heavy Duty Clutches — with wider, better-finished surfaces; heavier, more compact construction.

Whether you're building shovels or other equipment . . . or using them . . . you'll profit by specifying Twin Disc Friction or Hydraulic Drives . . . developed from 35 years of specialized experience, backed by 8 Twin Disc Factory Branches and 60 Twin Disc Parts Stations.

Lima-Hamilton Division, of Baldwin-Lima-Hamilton Corp., incorporates Twin Disc Clutches in many products, including Heavy Duty Model "E" Clutches in its Paymaster Shovels. Write for Bulletin 108-F.



TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

MEN *in the* NEWS

(*Continued from page* 204)



Autocar Div., White Motor Co. — I. N. Weaver has been named controller.

Carboloy Dept., General Electric Co.—**Walter E. Jones** has been named manager of vacuum melted products engineering.

Dodge Div., Chrysler Corp.—**Robert S. Schuyler** is now manager of the West Coast Truck Div.

Martin Aircraft Co.—**George S. Trimble** has been elected a vice-president to head the new Advanced Design Dept.

Chain Belt Co.—**William H. Brandt** has retired, and **W. E. Schauer** succeeds him as assistant secretary.

Winsmith, Inc.—**John E. Sixt** was promoted to sales manager and **Richard E. Feldman** to assistant general manager.

Hyster Co.—**Lewis W. Krumbein** has been named coordinator of lift truck promotion, and **Richard M. Taylor**, head of market research.

Borden Co., Chemical Div.—**Alfred B. Babcock, Jr.**, has been named chief project engineer.

AP Parts Corp., Miracle Power Div.—**Gordon S. Mather** has been appointed to the executive staff.

Aluminum Co. of America—**James A. McGowan** has become assistant sales manager of the New York district, and **William F. Courter** succeeds him at the Vernon works in Los Angeles, Calif.

Consolidated Vultee Aircraft Corp. —**Ralph L. Bayless** has been appointed assistant chief engineer, research and development, Convair-San Diego.

Resdel Engineering Corp.—**J. L. Diemar** has been made chief engineer.

Ohio Hoist & Mfg. Co.—**James W. Dickey** has been named president.

Olin Industries, Inc. — **Gene M. Brown** has been chosen assistant product publicity supervisor.

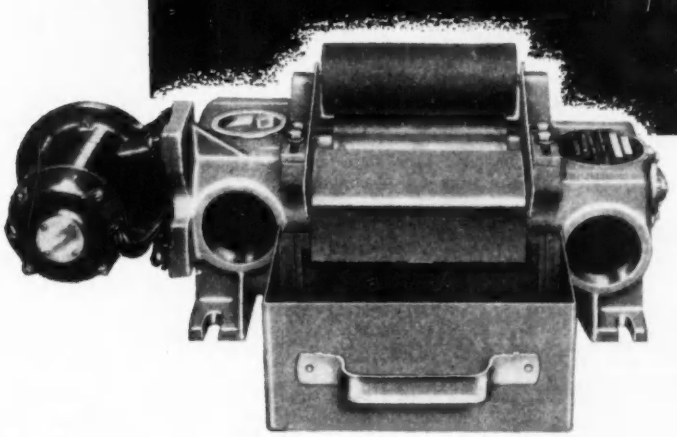
(*Turn to page* 208, *please*)

new!

Houdaille MAGNETIC SEPARATOR

FOR AUTOMATIC, LOW COST
REMOVAL OF FERROUS METALLIC PARTICLES
FROM COOLANTS AND CUTTING OILS

GRINDERS
MILLING MACHINES
GEAR SHAPERS
DRILLING MACHINES
HONING MACHINES
BROACHING MACHINES
and many others



NOW . . . a *completely new* Magnetic Separator designed to remove ferrous metallic particles and sludge from liquid coolants, mineral oils and soluble oil solutions used in all types of ferrous metal finishing operations. Automatic, continuous cleaning of coolants with the Houdaille Magnetic Separator provides:

- **Increased Production**
- **Longer Wheel & Tool Life**
- **Better Finishes with Fewer Rejects**
- **Greater Safe-Use Life of Oil or Coolant**
- **Lower Operating and Maintenance Costs**

IMPORTANT FEATURES:

EASY INSTALLATION ON MACHINE TOOL SUMP

Flexible design permits choice of three inlets and two outlets. Small, compact unit features five ports, drilled and tapped, for easy installation on machine sump . . . needs no extra floor space in most cases.

360° CONSTANT MAGNETIC ATTRACTION

Permanent ring magnets enclosed in revolving cylinder provide 360° of magnetic attraction. Evenly distributed . . . no spottiness. Assures complete removal of ferrous particles from coolant.

ECONOMICAL, TROUBLE-FREE OPERATION

Separator uses 1/70 hp. (4.8 RPM) gear head motor (TENV). Features smooth, automatic operation. Nothing to lubricate, nothing to get out of order. Can be operated in many cases off present 110-volt control circuit.

Write today for Equipment Bulletin giving complete details

HONAN-CRANE CORP.
404 Madison Avenue, Lebanon, Indiana
a subsidiary of
HOUDAILLE-HERSHEY CORPORATION

Save Labor... cut costs with

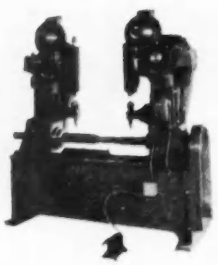
FASTER Riveting and Clinching!

T-J



RIVITORS

T-J RIVITOR used for automotive clutch plate assembly. Saves time and labor doing a four-fold job—assembling, setting, inspecting and ejecting.

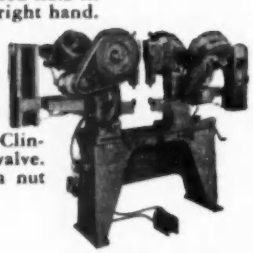


DOUBLE RIVITOR sets two rivets at a time! Equipped with 10" hoppers, and tooled to automatically feed and set two ¼" dia. x ⅝" long wagon box head rivets at a time in elevator chain and raddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.



CLINCHORS

T-J CLINCHOR . . . one of six special 8" throat Underfeed Clinchors used by a large automotive body manufacturer. Feeds and sets 11/16" square cased nuts in outside quarter panels, left and right hand.



DOUBLE CLINCHOR sets two nuts at once! Tooled to feed and set ⅜" x ½" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors tripped by same foot-operated valve. Adaptable to wide range of clinch nut setting problems.

Automatic Feeding and Setting!

T-J meets your needs for labor saving SPEED in assembly . . . with performance-proved Rivitors and Clinchors for many jobs today . . . in aircraft, automotive, farm machinery, stampings of all kinds.

T-J CLINCHORS set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal! Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J RIVITORS automatically feed and set solid rivets . . . with high production! Electrically powered Rivitor sets 1/16" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅛" diam. and up to ¾" long. Throat depths 8" to 36".

Write for Clinchor bulletin 847; Rivitor bulletins 646 and 847. The Tomkins-Johnson Co., Jackson, Mich.

38 YEARS EXPERIENCE T-J

TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

MEN *in the* NEWS

(*Continued from page* 206)



Ingersoll Steel Div., Borg-Warner Corp. — Stephen L. Ingersoll was promoted to executive vice-president.

Plymouth Div., Chrysler Corp.—**Paul M. Ruef** has been appointed to the executive sales staff.

Aircraft Parts Manufacturers Association — **Henry E. Scofield** was selected managing director.

Tomkins-Johnson Co.—**Dorothy M. J. Tracey** was elected president. She succeeds the late A. R. Johnson, her father.

Mather Spring Co. — **Richard W. Bartlett** was chosen director of purchasing and production planning.

Gould-National Batteries, Inc.—**Dr. Harold E. Zahn** has been named director of research.

Mechanical Handling Systems, Inc., Package Handling Div.—**Clifton W. Johnson** has been appointed sales manager.

Kaiser Motors Corp.—**S. A. Girard** was appointed general manager in charge of Toledo automotive operations.

Aeronca Mfg. Corp.—**Frank A. Sandker** has been chosen to head the new Development Dept.

Joy Mfg. Co.—**John Lawrence** has been elected executive vice-president.

Micro Switch Div., Minneapolis-Honeywell Regulator Co. — **Emmett N. Hughes** is now western sales manager, while **John K. Lincoln** has become eastern sales manager. **Anderson Wacaser** has been chosen to head market research.

General Electric Co., Aircraft Gas Turbine Div.—**John F. Walrath** has been named manager of finance for the Jet Engine Dept.

Acme Steel Co., Dexion Div.—**P. L. Dafoe** has been named to head this new division, while **Lewis R. Miller** has been chosen assistant manager.

LearCal Div., Lear, Inc.—**Robert Boyer, Jr.**, has joined the organization as military sales manager.

(*Turn to page* 210, *please*)

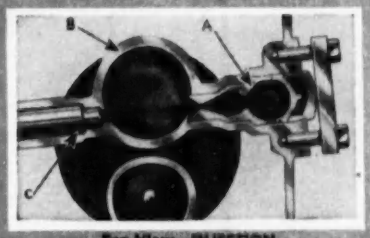


RED SEAL® *Cushioned Power* DIESEL

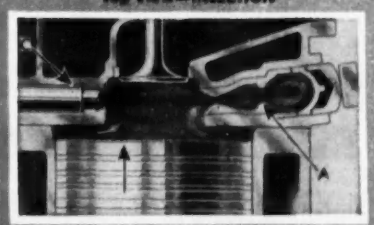
Cut Fuel Cost MORE THAN HALF

When Roberts & Turner Machinery Co., Continental distributors at Lewiston, Me., replaced the competitive gasoline engine in this unit with a Red Seal TD-6427 Cushioned Power Diesel, fuel cost for the 320-mile Bangor-Presque Isle round trip dropped 57 per cent. Cole's Express of Maine is only one of a long list of haulers who have followed the Cushioned Power Diesel route to lower ton-mile costs. See your Continental distributor, or write:

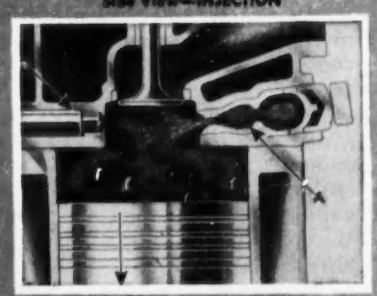
CONTINENTAL DIESEL CUSHIONED POWER COMBUSTION CHAMBER



Top View—INJECTION



Side View—INJECTION



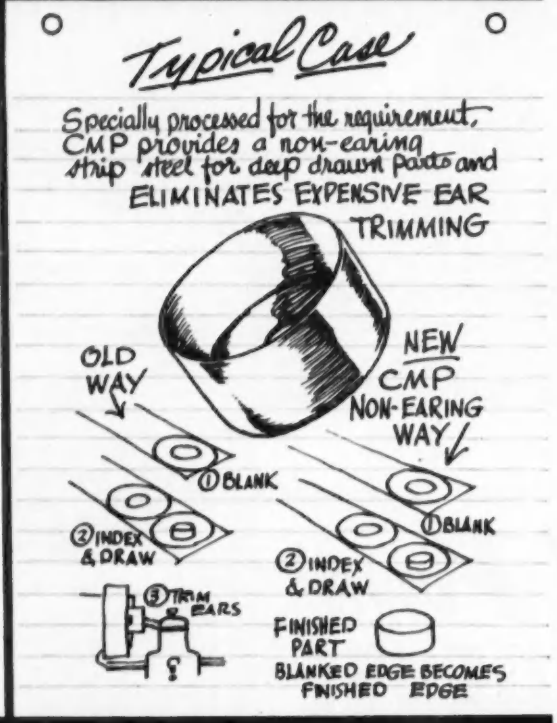
Side View—POWER STROKE

Continental Motors Corporation
MUSKEGON, MICHIGAN

1819 BROADWAY, NEW YORK 23, NEW YORK • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF.
6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 910 S. BOSTON ST., ROOM 1008, TULSA, OKLA.
1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GA.

CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD ®

CMP COLD ROLLED STRIP STEEL OFFERS *a practical way to reduce end-product costs* WITHOUT CAPITAL INVESTMENT



CMP's precision rolling process permits production of cold rolled strip steel as thin as .001" to split-hair across-the-width gauge tolerances not obtainable by other rolling methods. This unique precision is reflected in less square footage loss through oversize variation, less wear on tools, fewer rejections and faster assembly where close fitting is encountered.

CMP processes also permit close control of physical characteristics to develop the combination of physicals best suited to the fabricating and service requirements of the application.

We'll be happy to work with you to develop specifications and processing methods to enable you to make the best possible product at the lowest possible cost.

the Cold Metal Products co.

GENERAL OFFICES: YOUNGSTOWN 1, OHIO

PLANTS: YOUNGSTOWN, OHIO AND INDIANAPOLIS, INDIANA

SALES OFFICES: New York • Cleveland • Detroit • Indianapolis; Chicago • St. Louis • Los Angeles • San Francisco

LOW CARBON, HIGH CARBON (Annealed or Tempered), STAINLESS AND ALLOY GRADES, ELECTRO ZINC COATED ARE AVAILABLE FROM:

THE COLD METAL PRODUCTS CO. OF CALIFORNIA
6600 McKinley Avenue, Los Angeles — Phone: PLeasant 3-1291

THE KENILWORTH STEEL CO., 750 Boulevard, Kenilworth, New Jersey
Phones: N. Y., COrtlandt 7-2427; N. J., UNionville 2-6900

PRECISION STEEL WAREHOUSE, INC.
4425 W. Kinzie, Chicago — Phone: COlumbus 1-2700

MEN *in the* NEWS

(*Continued from page* 208)



Clark Equipment Co., Industrial Truck Div.—L. A. DePolis has been appointed general sales manager.

Chevrolet Motor Div., General Motors Corp.—**S. P. Emmert** has been named Denver zone manager. He succeeds **T. C. Naquin,** recently made manager of the Sales Administrative Dept.

Permacel Tape Corp.—**John S. De Noia** was chosen assistant industrial sales manager.

Marion Electrical Instrument Co., Aviation Div.—**Harry A. Donahue, Jr.** has been made sales manager.

Oren Roanoke Corp.—**Phil J. T. Rawlins** was made chief engineer.

Republic Aviation Corp. — **Paul S. Baker** was promoted to chief, flight test, thermodynamics and dynamics; **Walter R. Bush,** technical assistant to the chief engineer; **James S. Martin,** chief, structure, research and weights; **C. E. Pappas,** chief, aerodynamics and thermodynamics; **Jerry Pavelka,** chief of aerodynamics; and **Robert F. Wichser,** chief research engineer.

Fairchild Camera & Instrument Corp.—**John N. Case** has been named executive vice-president.

Artisan Metal Works Co.—**Jack G. Allen** has been elected president, general manager, and a director.

Metals & Controls Corp.—**Carroll L. Wilson** has been elected vice-president and general manager.

Eaton Mfg. Co., Stamping Div.—**D. R. Burton** has become stamping sales manager and **D. F. Brawn** is now manager of the Cap Dept.

Westinghouse Electric Corp.—**Franklin H. Drew** has been appointed Pacific Coast service manager.

General Electric Co.—**Kenneth L. Walters** has been named consultant for media planning.

Fairchild Camera & Instrument Corp.—**James B. Moore** has been appointed director of public relations.

(*Turn to page* 212, *please*)

Payload....75 Tons

World's largest truck uses MIEHLE-DEXTER SUPERCHARGERS



Dumping 75 tons of sand . . . or hauling copper ore up 18% grades from pit to crusher—that's the every-day job of these giant M-D supercharged trucks used by an Arizona open-pit copper mine.

...moves more material faster at lower cost!

It takes *supercharged* power to haul a load like this! When Buda Diesels were selected to power the world's biggest truck, they made *sure of plenty of power* with Miehle-Dexter Superchargers. Buda's experience is typical. They find that simply adding an M-D Supercharger to their engines *boosts horsepower as much as 50% or more!* What's more, weight per horsepower is decreased. Little wonder that Miehle-Dexter Superchargers are found on so many of the country's leading Diesel engines.

You, too, can keep pace with the race for more horsepower by using M-D superchargers on your engines. The investment is usually far less than required by other methods. Write for bulletin.

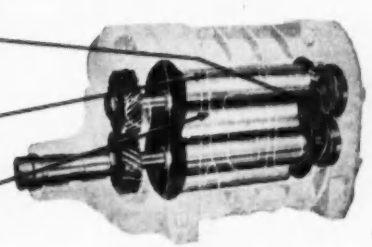
Only MIEHLE-DEXTER gives you all these features!

Internal construction uses patented rubber end plate seals. Eliminates metal contact, assures longer life, achieves fuel savings.

Special wear strips on rotors eliminate metal-to-metal contact, assure longer wear.

Lightweight aluminum rotors and housing boost power without adding weight.

Standardized parts allow easy field service.



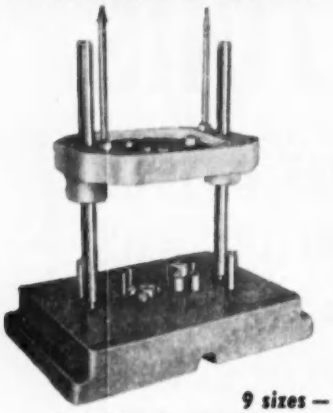
md

DIVISION OF THE DEXTER FOLDER COMPANY

100 Fourth Street • Racine, Wisconsin

Trust M-D Superchargers for internal combustion engines . . . use them for blower and air compressor operations, too.

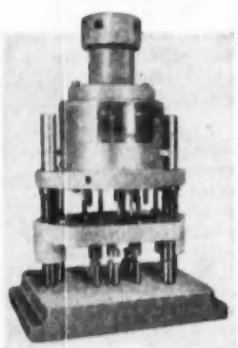
Zagar Self-clamping
DRILL JIGS
NOW STANDARDIZED for DRILLING, REAMING, TAPPING



9 sizes — 5 combinations per size — for hole patterns 3" through 15" dia.

Standardization makes for quick delivery and attractive price. Only a few minor parts need be made. Speed up machining operations. The operator merely feeds the parts — the Zagar Self-clamping Drill Jig does the rest. Zagar drill jigs are now "off the shelf".

◆ ◆ ◆



Zagar drill jigs can be used in conjunction with Zagar gearless multiple-spindle drill heads to ream, drill, and tap on standard drill presses and tapping machines. Or, Zagar can quickly supply the complete "package" unit.

◆ ◆ ◆

Write for new Bulletin "U-9"

ZAGAR TOOL, INC.
24000 LAKELAND BLVD., CLEVELAND 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

MEN *in the* NEWS

(*Continued from page* 210)



Modern Industrial Engineering Co.—H. J. Crain has been chosen sales engineer.

Acushnet Process Co.—**Richard B. Young** was elected treasurer, and **Karl P. Goodwin** was elected to the board of directors.

Clearing Machine Corp., Hamilton Div.—**Earl F. Mayer** was named controller.

Alan Wood Steel Co.—**Van Horn Ely, Jr.**, has been elected to the board of directors.

E. W. Bliss Co.—**Samuel J. Lombardo** is now a sales engineer at its Philadelphia district office.

Aluminum Industries, Inc., Permite Automotive Parts Div.—**Eugene H. Jarvis** is now service engineer.

Conoflow Corp.—**Warren H. Brand** has been named director of engineering and research.

Producto Corp.—**T. J. Rancont** is now district sales manager of the Detroit branch.

Caterpillar Tractor Co.—**W. M. Owen** has been chosen assistant chief engineer in charge of personnel and training at the Peoria, Ill., plant.

Galland-Henning Mfg. Co., Nopak Div.—**Robert W. Peterman** has been made sales manager.

Robertshaw-Fulton Controls Co.—**Milton E. Case** is now chief internal auditor.

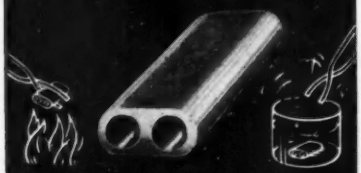
Super Tool Co.—**Milton J. Steffes** has been promoted to chief engineer in charge of all design, field engineering development, and new product engineering. **Kenneth R. Fisher** succeeds him as sales manager. **Louis B. Szal** has been promoted to works manager.

Quaker Rubber Corp.—**W. H. Pender** is now manager of belting sales.

White Motor Co.—**Robert G. Oakley** is now branch manager at Akron, O.

Bonney Forge & Tool Works—**Wilder Moffatt** has been named projects engineer.

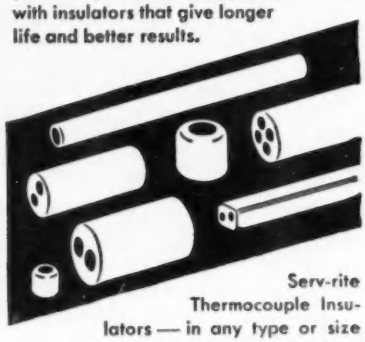
Be Certain WITH "SERV-RITE"
THERMOCOUPLE INSULATORS



This Gordon Thermocouple Insulator, heated red hot and plunged into cold water, came out just as good as new

Available only through GORDON, Serv-rite Thermocouple Insulators are made to stand the gaff of excessive thermal shock far above normal requirements.

For sturdy and reliable thermocouple insulator performance to meet peak production needs—specify Serv-rite . . . a development backed by Gordon's many years' experience in supplying industry with insulators that give longer life and better results.



Serv-rite Thermocouple Insulators — in any type or size — can be supplied immediately from Gordon's large stocks in the Chicago and Cleveland plants. Remember — you can always distinguish Serv-rite Insulators by their tan color.

Fish Spine Beads
Asbestos Tubing
Double Hole Round
Asbestos String
Single Hole
Double Hole Oval

GORDON SERVICE
CLAUD S. GORDON CO.
Manufacturers & Distributors
Thermocouple Supplies • Industrial Furnaces & Ovens
Pyrometers & Controls • Metallurgical Testing Machines
Dept. 13 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 13 • 2035 Hamilton Ave., Cleveland 14, Ohio

Announcing

Electronic

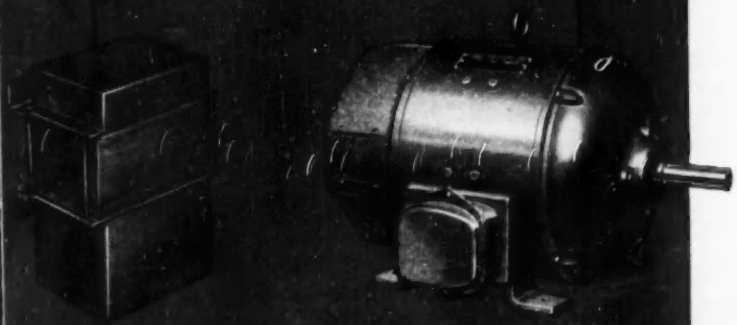


precision speed control

wide speed range

rugged, reliable construction





Connect this new Electronic Select-A-Spede to your A.C. power source and get infinitely adjustable speeds in ranges of 5:1, 20:1, or 50:1, with 100:1 also available for some applications. And that's not the only feature of this new variable speed drive. You get precise speed regulation — as close as ½% with tachometer feedback. You get rugged design for tough industrial service — simple, reliable, electronic circuits.

This new Electronic Select-A-Spede consists of an anode transformer, control panel, pushbutton station, and D.C. drive motor. Transformer and control can be located in almost any convenient place with motor and pushbutton station available in any enclosure you need. And you can get many electrical and mechanical modifications, as well as a variety of optional features — inching, reversing, threading, etc.

The Electronic Select-A-Spede is ideal for machine tools, test equipment, conveyors, printing presses, balancing machines — wherever high flexibility and precise speed control are needed. Get full information on this versatile new drive from Bulletin No. 1500. Ask your Louis Allis Sales Engineer for your copy or write to us.

THE LOUIS ALLIS CO.



F. S. DOYLE
Equipment Service Company, Inc.
Birmingham, Ala.
Offers years of sales and service experience in the pneumatics industry. Now concentrates on hydraulic and compressed air equipment and accessories for the mining, general manufacturing, and construction industries in Alabama.



E. V. ESTILL
Air Products Co., Savannah, Ga.
Specializes in pneumatic and hydraulic equipment applications in the textile, textile machinery, wood products, wood product machinery, shipbuilding, and other industries in North Carolina, South Carolina, Georgia and Florida.



JACK J. KOLBERG
Jack J. Kolberg Co., Buffalo, New York
Provides engineering service and supplies pneumatic and hydraulic equipment to Upstate New York manufacturers in the automotive, aircraft, camera, chemical, refrigeration and electronic fields.



GEORGE M. PEARSE, JR.
Pearse-Pearson Co., West Hartford, Conn.
Sales offices in West Hartford, Providence and Boston provide sales and engineering service on air and hydraulic equipment to New England machine tool builders, rubber plants, electrical manufacturers and metal working companies.

For the know-how you need...on fluid line problems

CALL YOUR HANSEN REPRESENTATIVE

HANSEN REPRESENTATIVES
Quick-Connective Couplings
Are Their Business
But So Are Fluid Line Problems

Baltimore	Los Angeles
Birmingham	Louisville
Buffalo	Milwaukee
Chicago	Minneapolis
Cleveland	Newark
Dallas	New Orleans
Dayton	Philadelphia
Denver	Pittsburgh
Detroit	San Francisco
Ft. Wayne	Savannah
Hartford	Seattle
Kansas City	St. Louis

Montreal • Toronto • Vancouver
Export Department: Cleveland

• The next time you need help in a hurry, call your Hansen representative. From years of on-the-job experience he can often make suggestions that will quickly clear up your difficulties—either when actual troubles arise—or when hook-ups are being planned or altered.

Quick-Connective couplings are, of course, the main business of the Hansen representative, but so are fluid line circuits. By the very nature of his job, he is thoroughly familiar with practically every type of hook-up. He knows what works—and why it does.

Make use of his services—you'll find his know-how a real help over the rough spots.



QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION
2. INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off



Two-Way Shut-Off



ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS
Send for Catalog!

THE HANSEN MANUFACTURING COMPANY
4031 WEST 150th STREET • CLEVELAND 11, OHIO

"ANOTHER QUALITY PRODUCT MADE FROM INLAND COLD ROLLED SHEETS"



VICTOR
GASKETS AND OIL SEALS

Production V. P. O. W. Clifton points out to Steel Buyer, Harold North, a severe draw on one of the over 600 different types of oil seals manufactured by Victor.

"INLAND COLD ROLLED SHEETS *set the standard at Victor"*

—says Harold North, Steel Buyer at Victor Mfg. & Gasket Co., Chicago, Illinois.

When Victor Mfg. & Gasket Company, one of the world's best known manufacturers of high quality gaskets and oil seals, buys steel for their oil seal division, they specify "Inland cold rolled sheet quality" on the order.

"Uniform drawing quality is an absolute must with us," says O. W. Clifton, Production Vice President, "or we risk expensive die breakage with resultant machinery 'down-time' and production loss. Over the years we have found Inland's cold rolled sheets are consistently uniform and well within our tolerance range. We can depend on them to deliver the specific drawing quality requirements we set up for them, time after time."

If uniform drawability or thickness is one of the problems in the manufacture of your steel products, it will pay you to talk over your requirements with one of Inland's steel sheet specialists. They've built a reputation on solving the "tough ones."

INLAND **COLD ROLLED SHEETS**

INLAND STEEL COMPANY, 38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport • St. Louis • Kansas City • Indianapolis • Detroit • New York

Plenty of Copper...

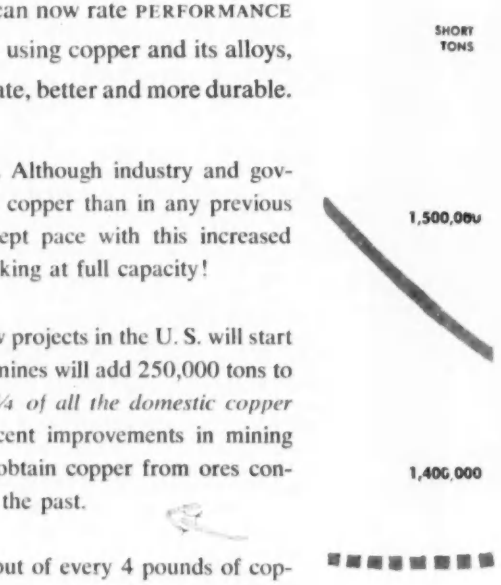
today and tomorrow

The assurance that copper is in abundant supply and *can be used without restrictions* is the "go ahead" for industry. You can now rate PERFORMANCE over AVAILABILITY when choosing materials. By using copper and its alloys, brass and bronze, your product is easier to fabricate, better and more durable.

We can get more copper than we now have. Although industry and government have been consuming more copper than in any previous peacetime period, production has kept pace with this increased demand. And producers are not working at full capacity!

More copper keeps on coming. Eleven major new projects in the U. S. will start producing in the next 3 years. These mines will add 250,000 tons to our annual production—more than *¼ of all the domestic copper mined during 1953.* In addition, recent improvements in mining techniques now make it possible to obtain copper from ores considered commercially unworkable in the past.

Copper is virtually indestructible. At least 3 out of every 4 pounds of copper used in today's products, when scrapped, can be re-used in the future. Every day we are adding to our "copper capital". The more copper we use . . . the more we have!



Copper or its alloys provide these advantages . . .



Best conductor of electricity commercially available.



Does not rust . . . high corrosion resistance.



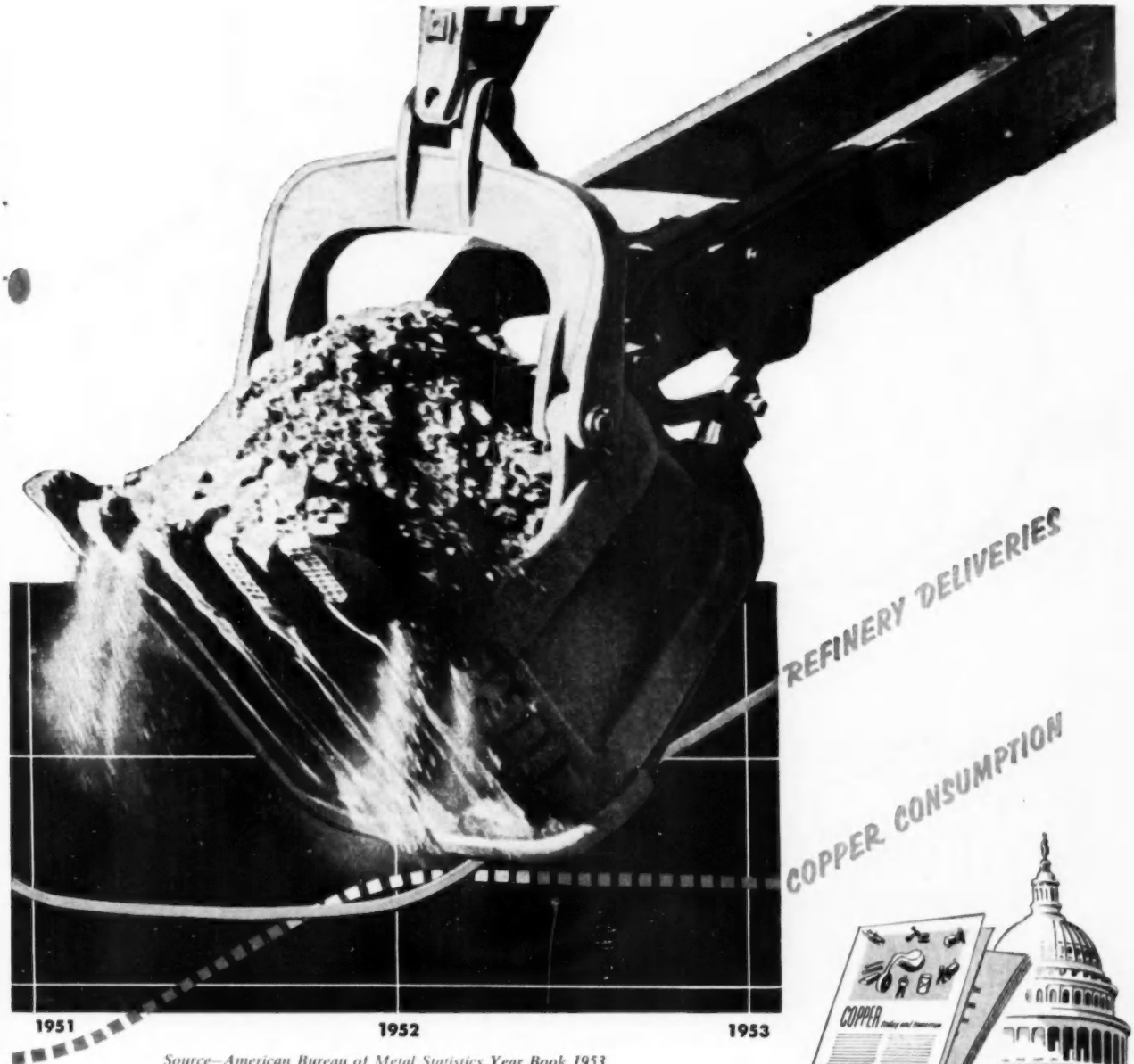
Best heat transfer agent of all commercial metals.



Easy to machine, form, draw, stamp, polish, plate, etc.



Welds readily . . . excellent for soldering and brazing.



Source—American Bureau of Metal Statistics Year Book 1953

Copper has a new ability to serve you. Many of your problems are being solved in the laboratories of the copper and brass industry. Whether it's a new alloy, a different temper or a special property . . . copper can help you develop new ideas. Copper can bring old methods up to date. Call a supplier of copper and brass and convert your thoughts to action!

COPPER & BRASS
Research Association

❊ ***"Copper . . . is fortunately available in ample supply to meet any foreseeable demand"***

Foreword, U. S. Dept. of Commerce
B.D.S.A. Copper Quarterly, August 1954

For information about U. S. copper supplies including free copies of this Government report and the new booklet, "Copper . . . Today and Tomorrow", send attached coupon to:

Copper & Brass Research Assn., Dpt. R
420 Lexington Ave., New York 17, N. Y.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....



New lightweight grinder is a HEAVYWEIGHT WORKER!



Why weigh down an operator with a heavier grinder? Put a new 7 pound air-powered CP Vertical Grinder in his hands and he'll remove the same amount of metal as he formerly did with a 10 pound tool!

Designed for driving cup wire brushes and grinding wheels, sanding discs, and cut-off wheels, the CP-3190 is tops for its handling ease and versatility. The features below explain why the CP-3190 takes the constant beating of heavy industrial usage with minimum maintenance:

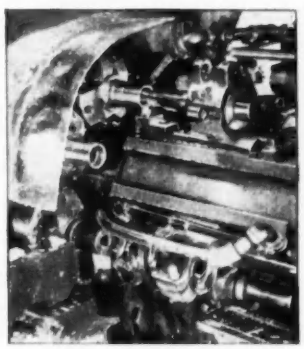
- **Splined type floating rotor to prevent end-plate wear from wheel thrust.**
- **Continuous lubrication is afforded by large oil reservoir and built-in lubricator.**
- **Safety governor valve cuts off air supply in the event of possible governor failure.**

Available in speeds up to 8000 RPM and in capacities capable of handling 6" cup wheels, and 7" and 9" disc sanding pads and cut-off wheels. For more information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

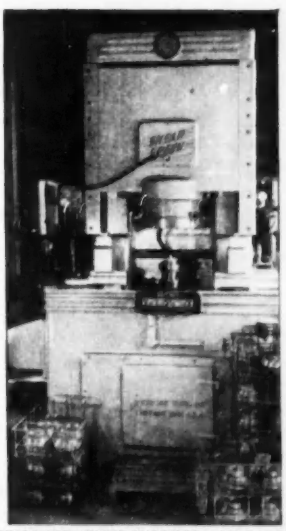
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

ask
an
amgears
man
about
our
high speed
facilities
to
produce



WHEN IT'S QUALITY AND QUANTITY YOU NEED

air
spec
gears
and
assemblies
on
time



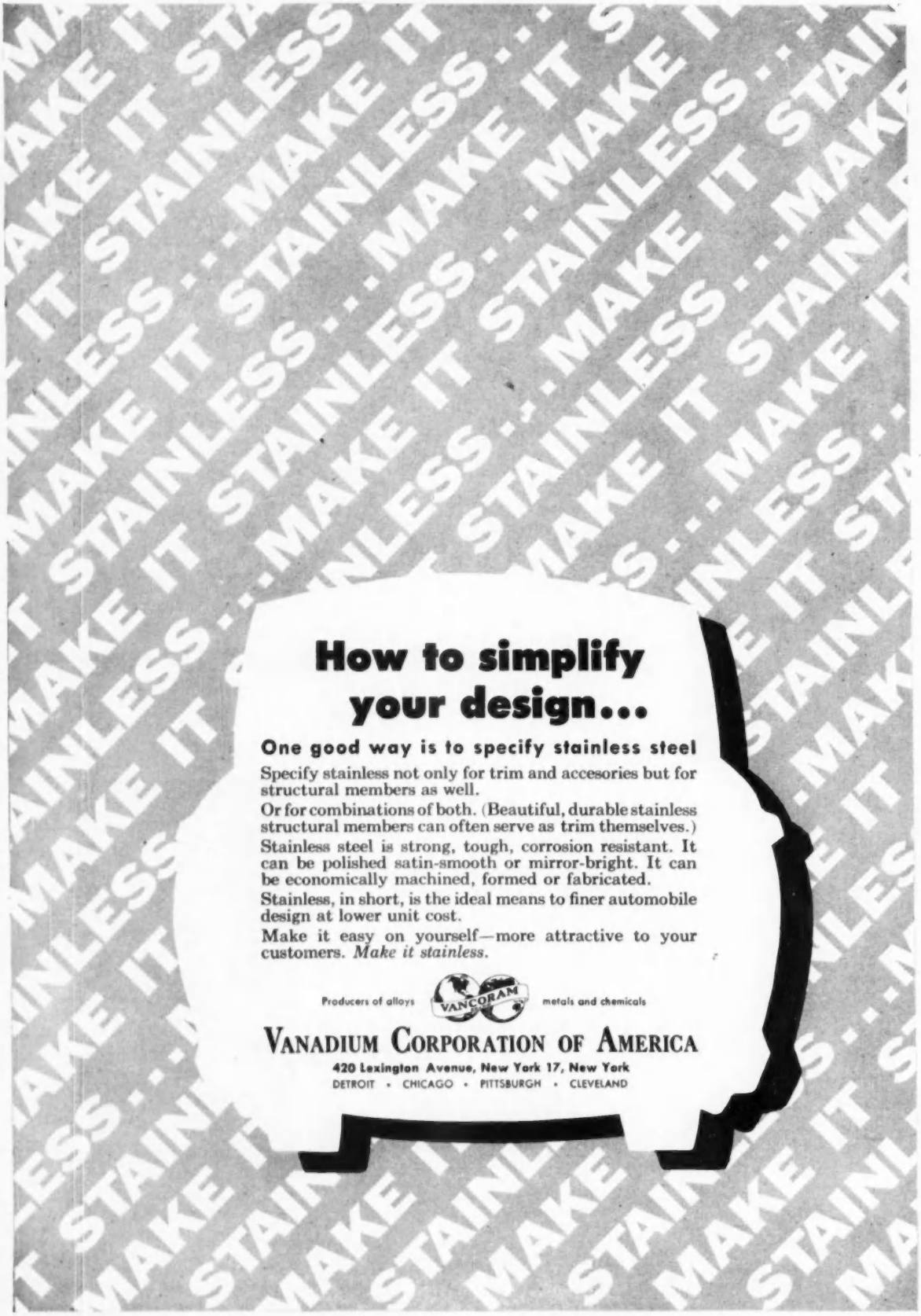
AM Accurately Made gears, INC. A SUBSIDIARY OF HUPP CORPORATION

CLEVELAND • DETROIT • CHICAGO

GEARS FOR GUIDED MISSILES • OIL PUMPS
JET ENGINES • ALTERNATORS • GENERATORS
FUEL PUMPS • ACTUATORS



2 BIG PLANTS for gears and gear assemblies • CHICAGO, 6633 WEST 65th STREET • **DETROIT,** 7450 MELVILLE


How to simplify your design...
One good way is to specify stainless steel
Specify stainless not only for trim and accesories but for structural members as well.
Or for combinations of both. (Beautiful, durable stainless structural members can often serve as trim themselves.)
Stainless steel is strong, tough, corrosion resistant. It can be polished satin-smooth or mirror-bright. It can be economically machined, formed or fabricated.
Stainless, in short, is the ideal means to finer automobile design at lower unit cost.
Make it easy on yourself—more attractive to your customers. Make it stainless.
Producers of alloys
VANCORAM
metals and chemicals
VANADIUM CORPORATION OF AMERICA
420 Lexington Avenue, New York 17, New York
DETROIT • CHICAGO • PITTSBURGH • CLEVELAND



Recording strain in boom of power shovel with Brush Universal Amplifier and Dual-Channel Oscillograph.

WHAT DO YOU WANT TO MEASURE?

Brush Portable Instruments will put it in writing . . . immediately



Recording engine torque with Brush Universal Amplifier and Oscillograph.

You can save hours of engineering time and streamline your testing with Brush Recording Instruments . . . which measure and record stress, strain, vibration, pressure, torque, electrical characteristics and many other variables. Chart records, which eliminate laborious plotting, are produced instantaneously. The charts permit quick visual examination and also provide a permanent record of tests.

Brush offers a complete line of amplifiers, oscillographs and "packaged" analyzers for specific measurement jobs. You can record a single channel of data, or up to six channels simultaneously. You have a choice of direct-inking or combination ink and electric-writing oscillographs. Units are all designed for portability and rugged use.

For complete information call your nearby Brush representative, or write Brush Electronics Company, Dept. DD-9, 3405 Perkins Avenue, Cleveland 14, Ohio. In Canada: A. C. Wickman, Ltd., Toronto.

BRUSH ELECTRONICS COMPANY

INDUSTRIAL AND RESEARCH INSTRUMENTS
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES
MAGNETIC RECORDING EQUIPMENT
ULTRASONIC EQUIPMENT

formerly The Brush Development Co. Brush Electronics Company is an operating unit of Clevite Corporation.

MY CASTINGS must have these PROPERTIES



1. Light Weight
2. High Yield Strength
3. Corrosion Resistance
4. Free Machineability
5. High Shock Resistance
6. Pressure Tightness
7. Need No Heat Treatment



Then You Want

FRONTIER 40-E
ALUMINUM ALLOYS

More and more, they're turning to these amazing high-strength, featherweight alloys for every type of casting from truck axles to railway jacks, from aircraft parts to axial fan rotors. Frontier 40-E alloys are a special formula of aluminum with zinc, magnesium, titanium and chromium . . . as ideal for precision optical parts as for gun turrets. Frontier 40-E may be just the alloys to give YOU better results. Why not investigate?

HELPFUL INFORMATION ON YOUR ALLOY PROBLEM
in this free Frontier Data Book. Write for your copy today!

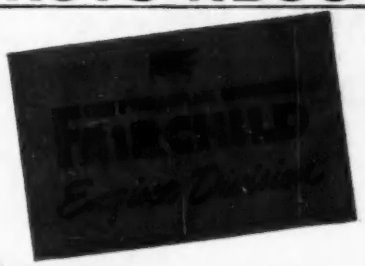


Remember — if ALUMINUM *can do it bettter* — FRONTIER 40-E ALUMINUM ALLOY *can do it best!*



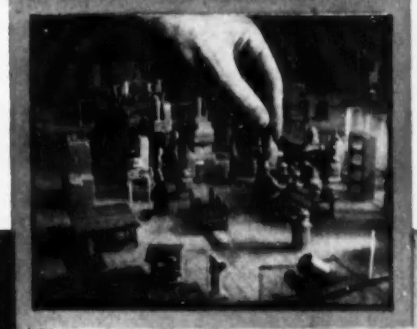
FRONTIER BRONZE CORPORATION
4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

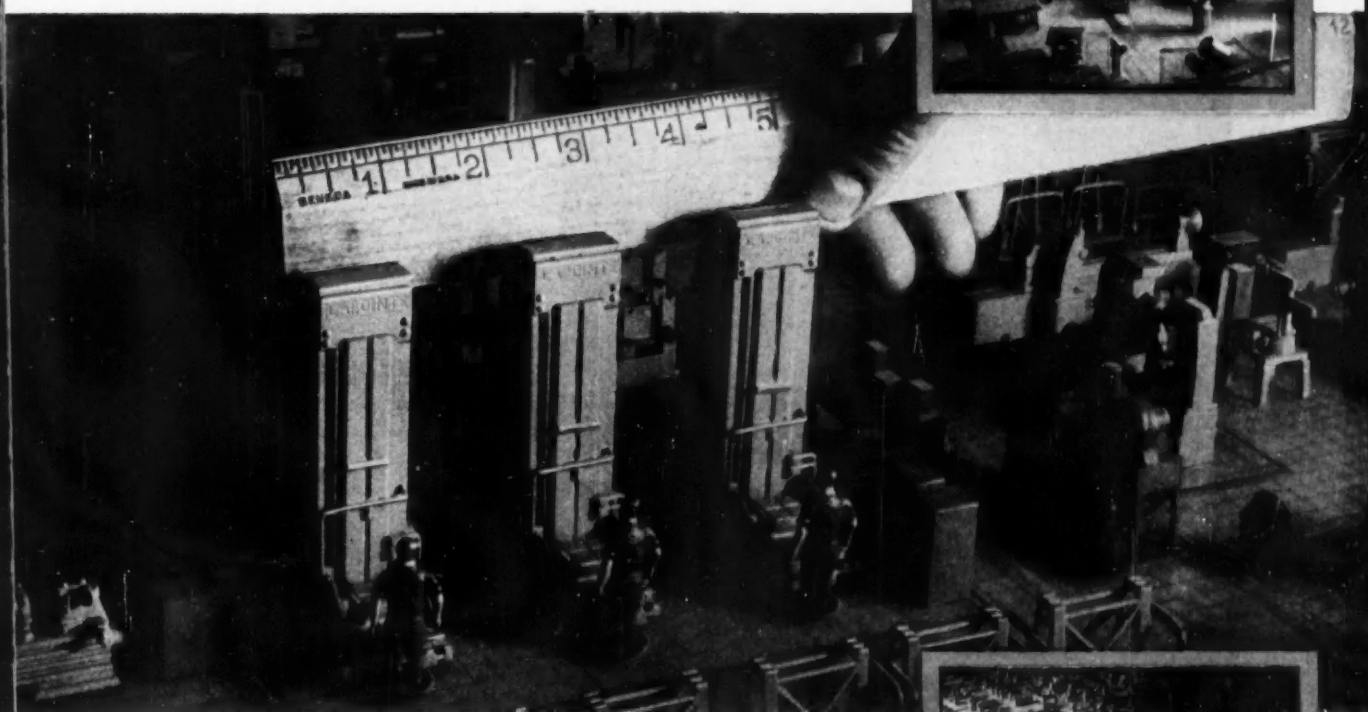
FACTS ABOUT



PRODUCTION ENGINEERING









3-D . . . in miniature . . . has an important production engineering role at the Fairchild Engine Division. Scaled-down duplicates of the big production lines save countless dollars and untold man hours . . . make possible complete pre-planning before actual production of turbojet engines, auxiliary powerplants and other power products begin.

Miles of blueprints for new floor plans are eliminated. Instead, technicians simply arrange scale models to arrive at the most efficient production layout. Then, actual plant layout is set up to agree with the scale layout. Advanced techniques like this are a part of *planned* production engineering at Fairchild . . . pushing efficiency up and costs down on major projects for *all* the Armed Services.

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Engine Division
FARMINGDALE, N. Y.

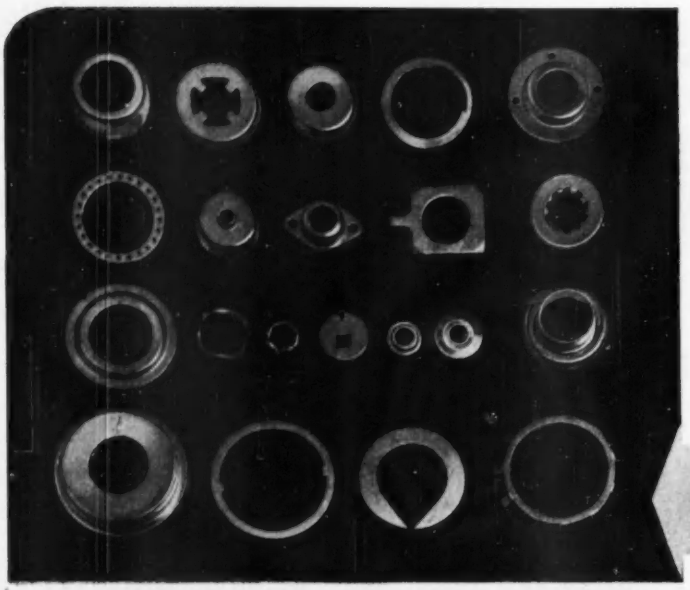
AMERICAN HELICOPTER DIVISION, Manhattan Beach, Calif.
AIRCRAFT DIVISION, Hagerstown, Maryland • GUIDED MISSILES DIVISION, Wyandanch, N. Y.
SPEED CONTROL DIVISION, Wickliffe, Ohio • STRATOS DIVISION, Bay Shore, N. Y.

A Source You Can Rely on...
A Name to Remember

Experience is a valuable asset in the development, manufacture and distribution of any product. In this respect we offer you the cumulative benefits of *Continuous Service to Industry Since 1887* . . . including origination and pioneering of mass-production equipment for the economical manufacture of washers.



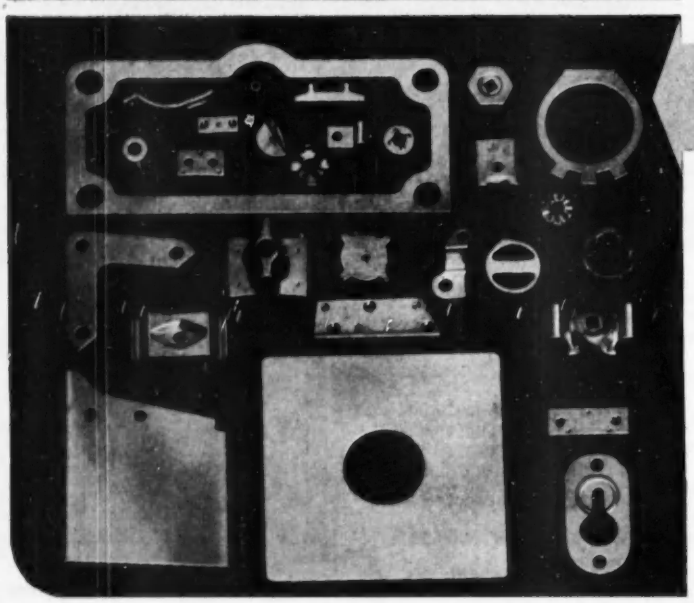
SINCE 1887



No matter what your washer requirements may be . . . whether for U. S. Standard Washers, SAE Washers, Rivet Washers, Lock Washers, Light Steel Washers, Finishing Washers, Machine Bushing Washers or Special Washers of any size, any desired material or finish . . . "MILWAUKEE WROT WASHERS" is the name to remember! Here, in the world's largest plant devoted to this specialized type of production, we have available more than 25,000 sets of dies — a priceless asset in providing the most complete and comprehensive selectivity to meet your needs.

Write for Catalog "30".

WASHERS



STAMPINGS

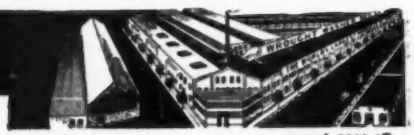
If it can be punched out of metal—if die-making ingenuity and tool-making facilities can provide the means for producing stampings to meet your production specifications; if the job can be handled most advantageously as a stamping—again, "MILWAUKEE WROT" is the name to remember. Here is a soundly established source of supply you can rely on — plus *Quality Standards* that are a source of pride to us, as manufacturers, and a source of satisfaction to our most discriminating customers. We'd like to serve you.

Let us quote on your requirements . . . covering fabrication in any material and in any finish. Furnished machined, heat-treated or surface-ground, as may be specified.

WROUGHT WASHER MFG. CO.

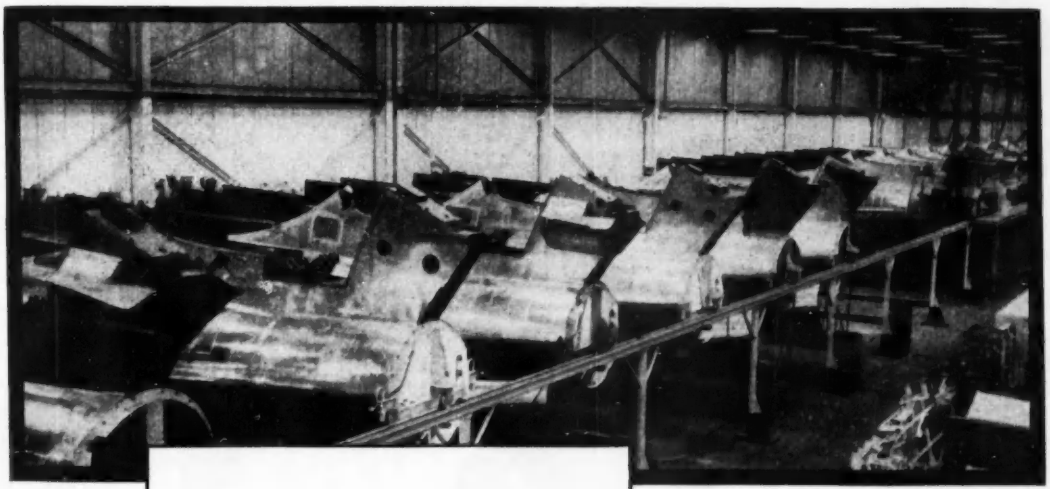
THE WORLD'S LARGEST PRODUCER OF WASHERS

2212 SOUTH BAY STREET • MILWAUKEE 7, WISCONSIN

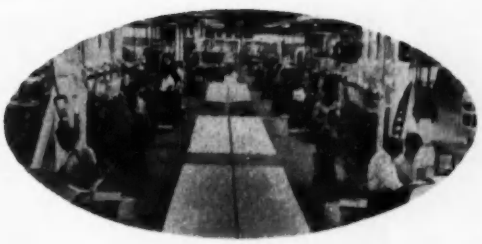


A 7883-1P

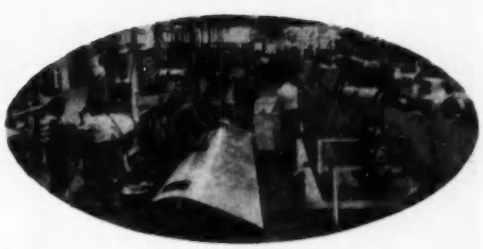
These five leading manufacturers are simplifying production by ordering major components from TEMCO.



TEMCO has proved its ability to produce in the past. Present 1954 schedules for Boeing, Convair, Lockheed, McDonnell, and Republic call for millions of pounds of assemblies and spares. The combined facilities of TEMCO's three plants are capable of producing 20,000,000 pounds per year. But there is more to it than quantity — for TEMCO has established a reputation for building a quality product, on schedule, at one of the lowest costs in the industry.







TEMCO
AIRCRAFT CORPORATION
DALLAS, TEXAS


TAKE THE NADELLA ROAD
IT'S THE ROAD TO SUCCESS...
THE FAMOUS ORIGINATORS OF NEEDLE CARTRIDGES AND NEEDLE BEARINGS WITH NEEDLE RETAINERS
loose needles
needle cartridges
complete bearings
Steering gear
King pin (Front axle)
133 a 137 BOULD NATIONAL
NADELLA
RUEIL-MALMAISON (S.O.) FRANCE



You can help us place a copy of this *new* book in your hands. Please give us your name and address. We'll do the rest. It will be *mailed* without cost to you—no intrusion on your time.

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

J&L STEEL

Jones & Laughlin Steel Corp., Dept. 430
3 Gateway Center, Pittsburgh 30, Pa.

Please send me a copy of your new ELECTREAT booklet.

Name_____

Title_____

Company_____

Address_____

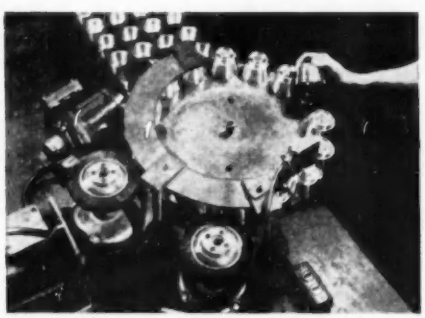


Cuts costs. Here, push-button brushing finishes both sides of brass discs at a rate of 15,000 per day. Does a more uniform job many times faster than former hand method.

This study of *your* operations could save you thousands of dollars

Every day, Osborn Brushing Specialists make startling improvements in production jobs such as shown above. They do this by studying cleaning and finishing operations and making an **O**sborn **B**rushing **A**nalysis . . . a written report with recommendations on all jobs which can be improved with the latest push-button brushing techniques.

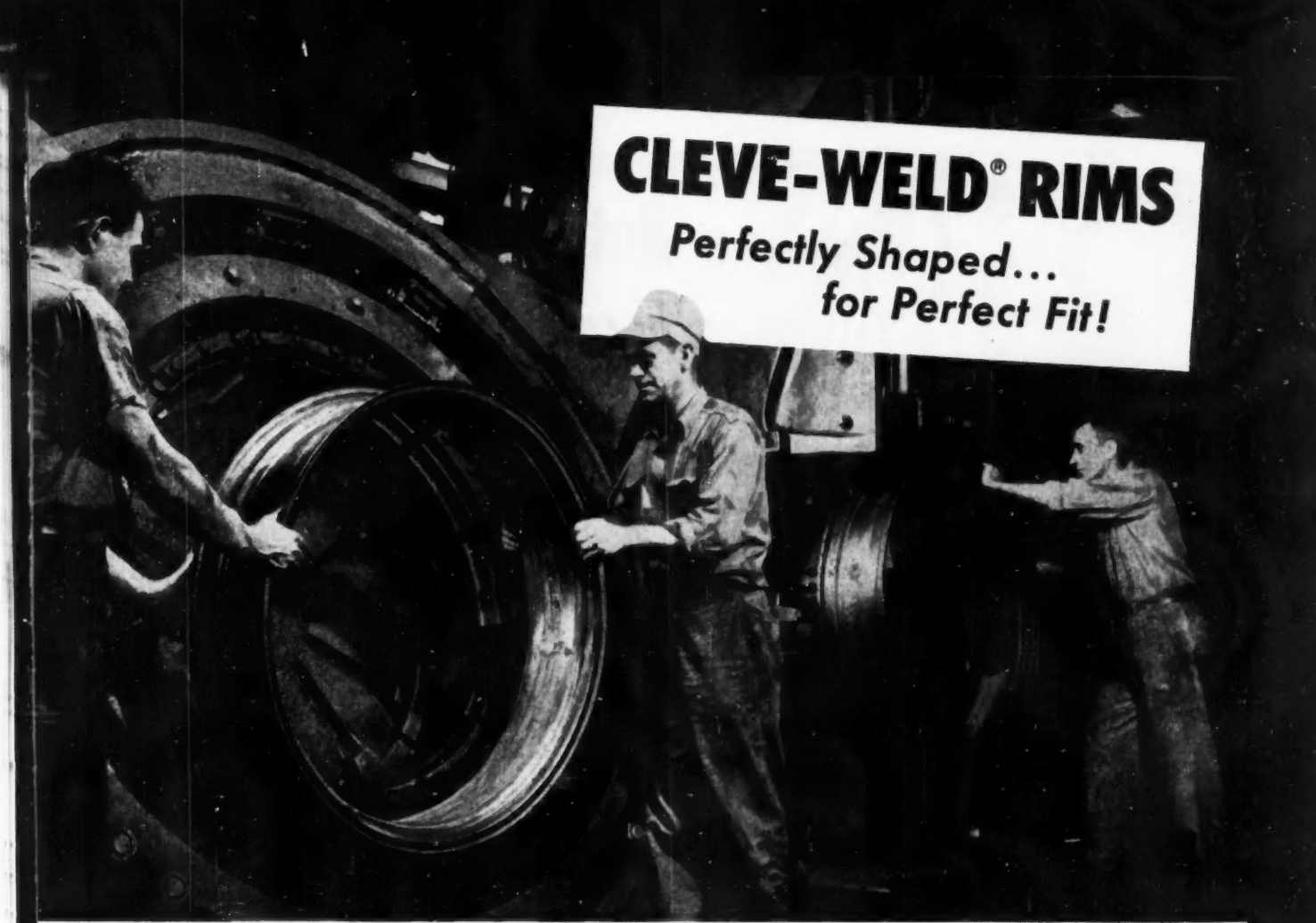
An **OBA** in *your* plant may save you thousands of dollars. It won't cost you a cent. Ask for an **OBA!** Call or write *The Osborn Manufacturing Company, Dept. E-21, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



Saves 74%. A manufacturer of aluminum components is now removing burrs and blending surface junctures of parts at a rate of 1400 per hour, compared to 360 with former hand method.

Osborn Brushing Analysis

TO HELP YOU DISCOVER HIGHER QUALITY AND LOWER COSTS WITH POWER BRUSHING



CLEVE-WELD® RIMS

Perfectly Shaped... for Perfect Fit!

EVERY CLEVE-WELD RIM, during its manufacture, is forcibly expanded and then compressed under tremendous hydraulic pressure to its final size and shape. This not only produces a rim of accurate dimensions and true circular shape but also proves the strength of the weld.

As a result, Cleve-Weld rims are unsurpassed in rugged durability and ease of mounting. Many leading manufacturers of trucks, cargo trailers, tractors and farm implements use them as original equipment on their products.

There's a type and size of Cleve-Weld rim to meet most manufacturers' requirements. Write for illustrated brochure. THE CLEVELAND WELDING COMPANY, W. 117th St., & Berea Rd., Cleveland 7, Ohio (a subsidiary of American Machine & Foundry Company, New York).

products are better... by design

CLEVE-WELD®

PROTECTO-TIRE RIMS

made better... to last longer



3-Piece Truck Rim



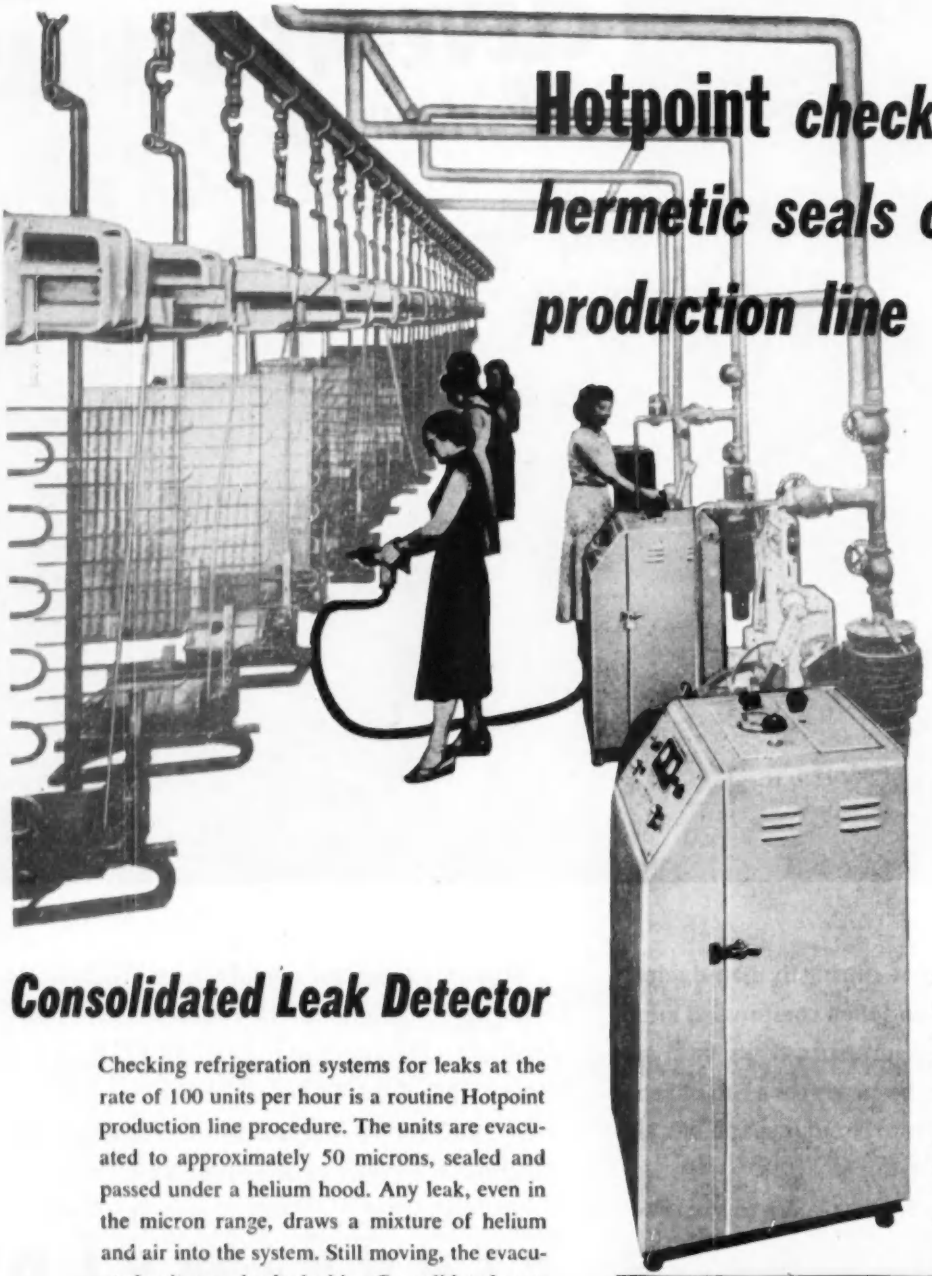
2-Piece Truck Rim



Deep-Well, Drop-Center Tractor Rims



Wide-Base, Attached-Clamp Tractor Rims



Hotpoint checks hermetic seals on moving production line

Consolidated Leak Detector

Checking refrigeration systems for leaks at the rate of 100 units per hour is a routine Hotpoint production line procedure. The units are evacuated to approximately 50 microns, sealed and passed under a helium hood. Any leak, even in the micron range, draws a mixture of helium and air into the system. Still moving, the evacuated units are checked with a Consolidated mass spectrometer-type leak detector. The slightest trace of helium sounds an audible alarm and the faulty unit is pulled off the line. These mobile, highly sensitive leak detectors are adaptable to a wide range of operations for production line control of both vacuum and pressure systems.

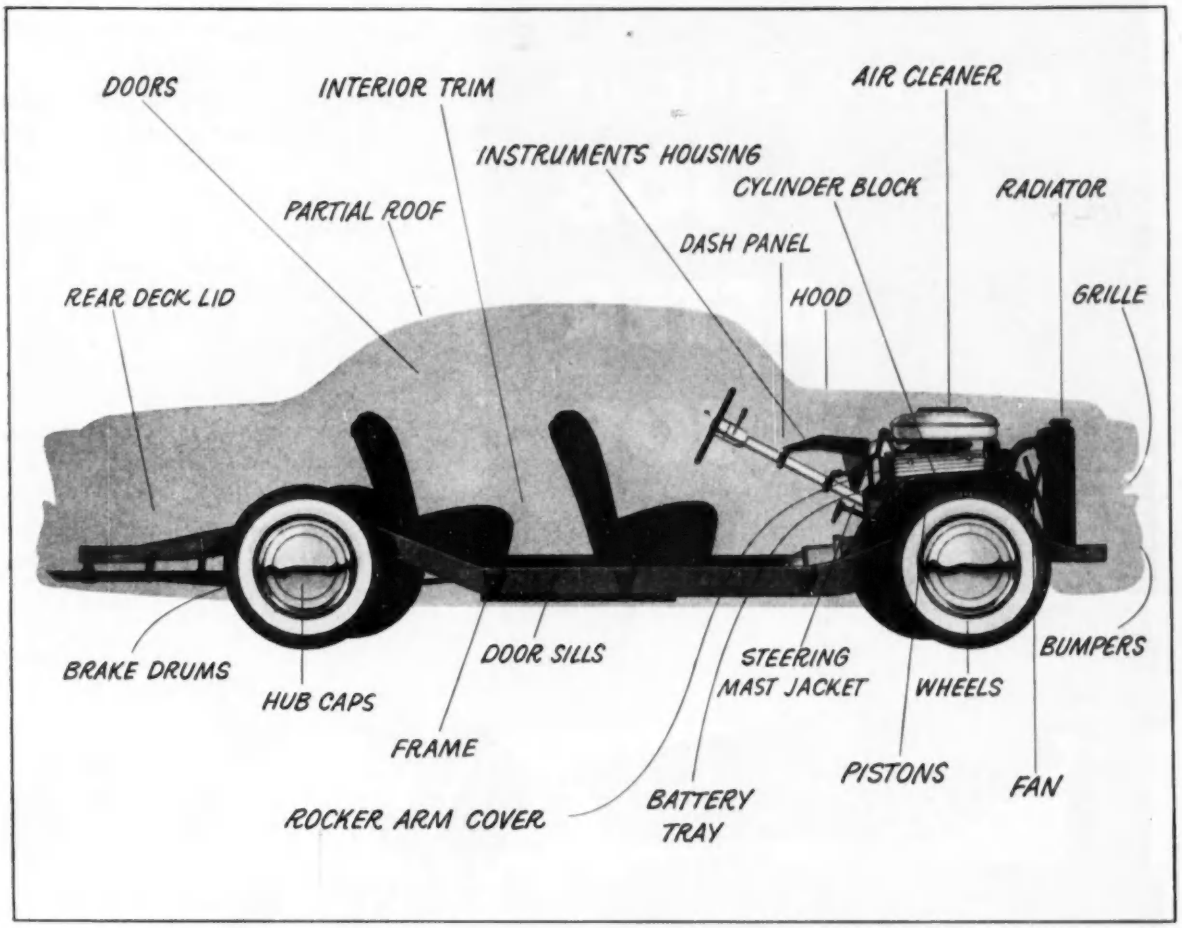
Completely portable in its light weight, castor equipped cabinet the Consolidated Model 24-101A Leak Detector is an accurate, practical tool for locating leaks wherever vacuum or pressure is used in factory, shop or laboratory. Write for Bulletin CEC-1801B—X20.



Consolidated Engineering
CORPORATION
300 North Sierra Madre Villa, Pasadena 15, California

Sales and Service through **CEC INSTRUMENTS, INC.,** *a subsidiary with offices in: Pasadena, Atlanta, Chicago, Dallas, Detroit, New York, Philadelphia, Washington, D. C.*

ANALYTICAL INSTRUMENTS FOR SCIENCE AND INDUSTRY



PREDICTION: ALL THESE PARTS WILL BE MADE OF ALUMINUM!

We believe that, in the near future, the use of aluminum for the 22 parts shown here will become as accepted by automotive engineers as the aluminum piston is today. In fact, we believe it's quite possible that eventually hundreds of parts will be made of aluminum.

We base this prediction on three factors.

Availability—Aluminum is now in abundant supply due to the vast expansion of the aluminum industry. You can plan to use aluminum with the assurance of continuing, dependable supply in any quantity or form you require.

Better parts—These parts will give better performance when made of aluminum because aluminum offers a *combination of advantages* no other material can match. For example, lightness, corrosion resistance, ability to deep draw on such items as battery trays mean a better product and faster, economical production.

Aluminum's lightness alone contributes to faster pickup and climb, more miles per gallon, and can lower the center of gravity. In addition, aluminum offers other advantages such as strength, heat conductivity, light and heat reflectivity.

Fabricating economy—Aluminum's workability makes it easy to fabricate, often at far less cost than other materials. It can be stretched, rolled, cast, drawn, forged, spun, stamped, extruded, and machined to make a wide variety of parts economically. And aluminum gives you a big price savings over other non-ferrous metals, because its light weight gives you up to three times more metal per pound.

Next time you are designing a part, stop and think—can it be better made with aluminum?

As America's fastest growing producer of aluminum, we believe we are ideally equipped to work with you. For complete information, contact any Kaiser Aluminum sales office listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

setting the pace—in growth, quality and service

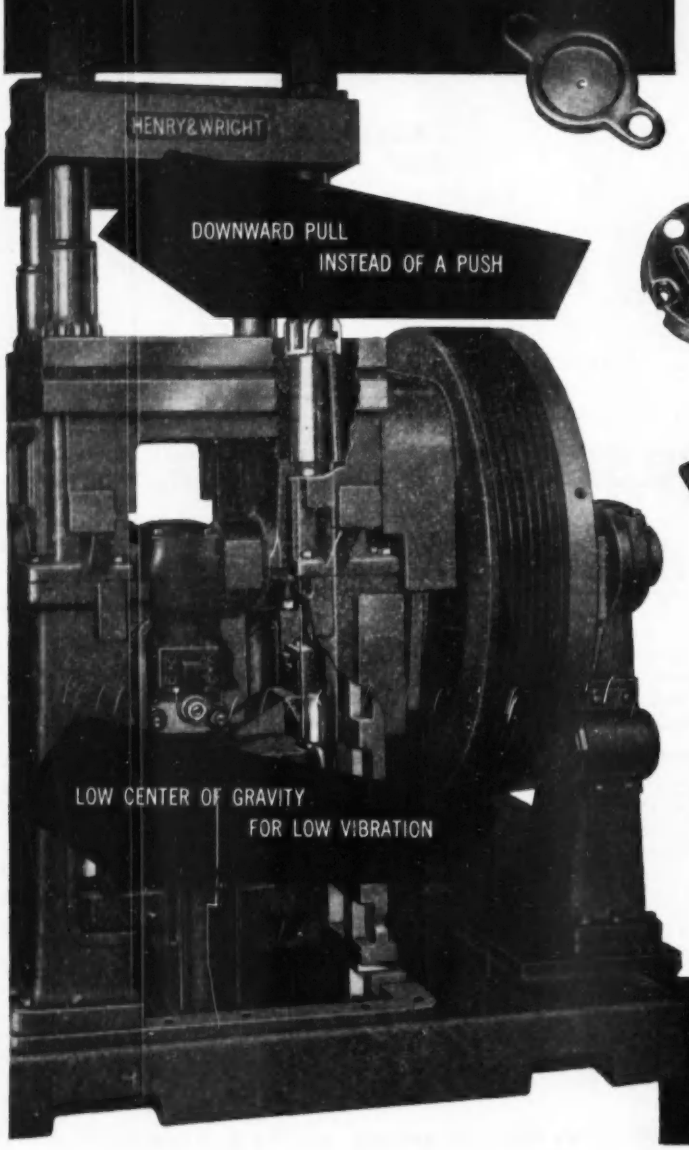
YOU CAN LINE UP JOB AFTER JOB

The Henry & Wright Dieing Machine is easy enough to set up so that moderate production runs are profitable.

You can schedule one job after another. Your H & W will get the work out, get it out right, and have it done when the schedule says it ought to be done.

Simple jobs that you want to complete at high speed. Close tolerance work. Tricky reverse bends. Full assemblies at one pass through the press. They all will go through your Henry & Wright, and with surprisingly short interruptions for setting up.

Four corner control of side thrust, and a downward pull instead of a push: These are two of the reasons why your Henry & Wright will withstand more off-centering of the die loads. Jobs like those shown can be easily run in sequence on an H & W.





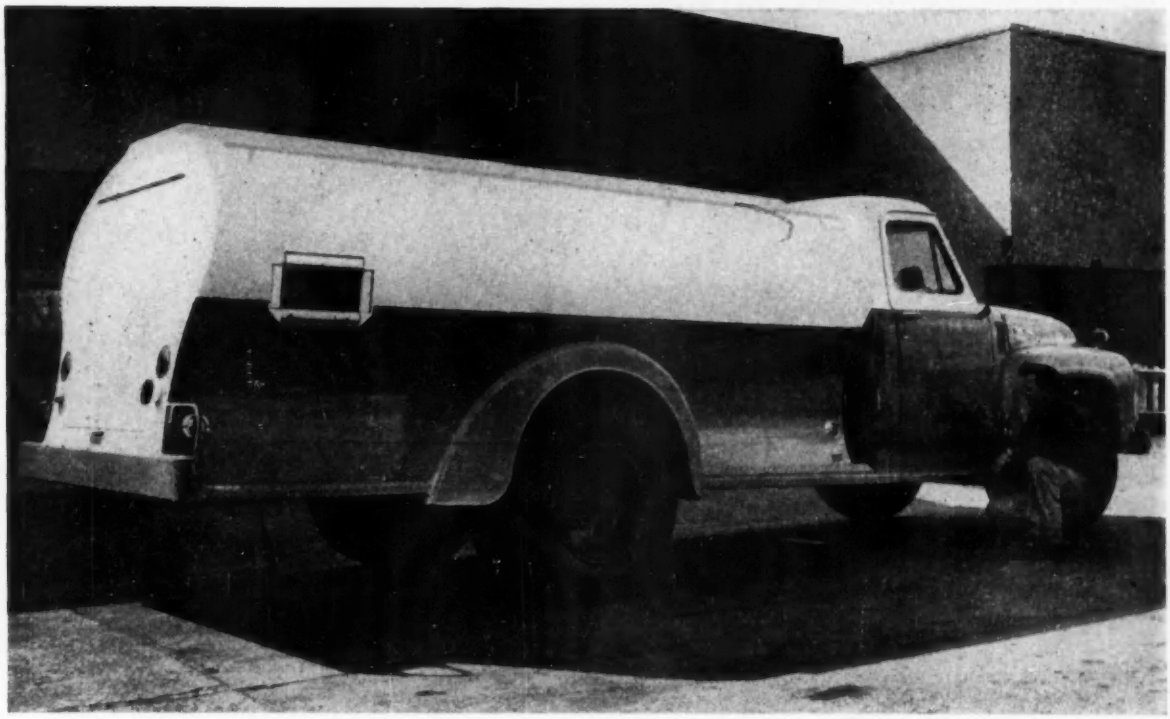
Henry & Wrights are making production runs that designers never had dreamed could be stamped at a profit. Our representative would like to show you some of the pieces.

Please write to Henry & Wright, 491 Windsor Street, Hartford, Connecticut.

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

HARTFORD, CONNECTICUT



Harold Kendall, Superintendent of Truck Welding & Equipment Co., Seattle, Wash., rubs chalk marks from "under 18,000" lettering on new tank truck just completed by his company.

How Mayari R helped hold down this tanker's license fees

To the owners of smaller trucks, the high state license costs are an important item of expense. For that reason especially, the purchaser of this 1260-gal fuel oil truck wanted the overall weight to be held below 18,000 lb.

The body builders—Truck Welding & Equipment Co., Seattle—were able to fulfill his wishes by fabricating the tank sides from Mayari R. Because this high-strength, low-alloy steel has a yield point nearly double that of plain carbon steel, they found that 12-gage Mayari R sheets would give the tank all the strength it would ever need. With carbon steel, they would have had to use 10-gage sheets, weighing about 28 pct more, sending the truck's weight over the 18,000 lb limit.

They also were able to weld and form the Mayari R sheets as readily as carbon steel, with no special methods or equipment. And its 5-to-6 times greater resistance to atmospheric corrosion, plus superior ability to hold paint, brought additional benefits to the owner.

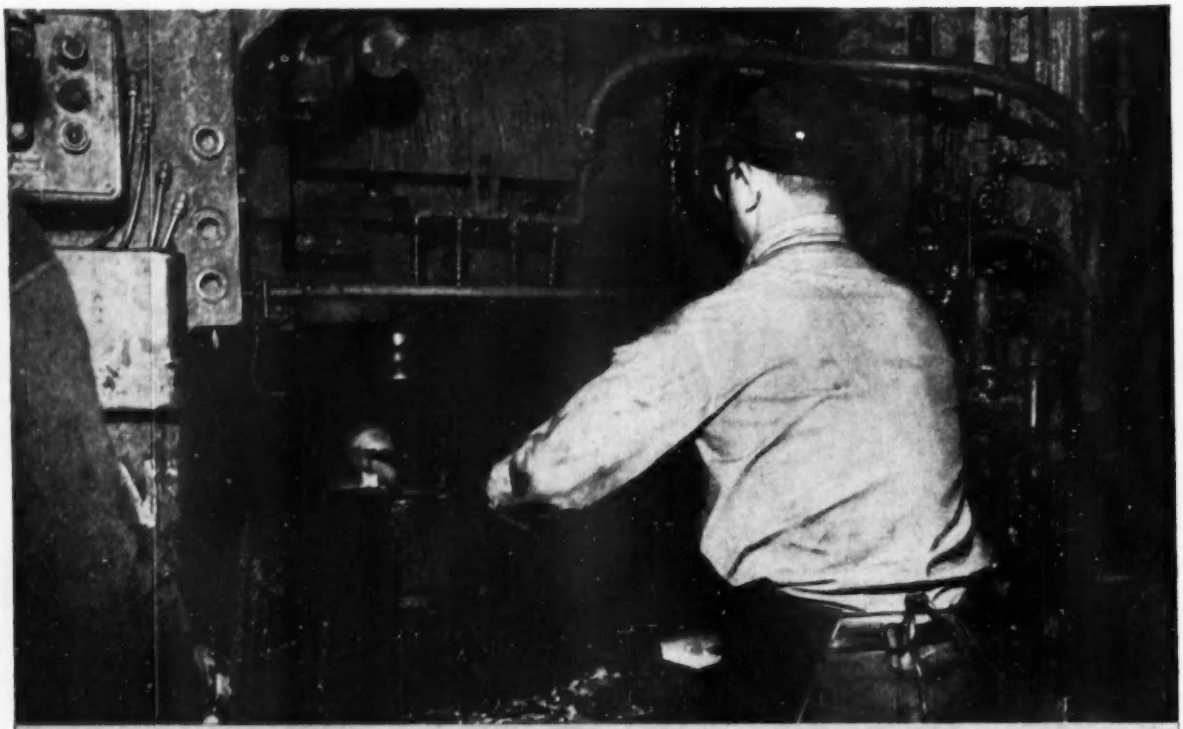
Add up these Mayari R advantages —superior strength, savings in weight, corrosion-resistance, workability, weldability—and you'll understand why this versatile steel is finding increasing application among vehicle manufacturers. These points are thoroughly described and illustrated in the brand-new Mayari R Catalog 353. If you haven't a copy, you can get one promptly by writing to the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Mayari R *makes it lighter... stronger... longer lasting*

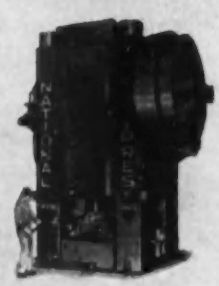


MODERN FORGING AT Ford

This new-design High Speed Forging MAXIPRES is hot-extruding ball-joint suspension forgings at the Ford Motor Co. Forge Plant, one of the world's largest, in Canton, Ohio.

Ford uses 7 MAXIPRESSES, 8 REDUCEROLLS and 24 NATIONAL High Duty Forging Machines—39 units in all—for many of its forgings.

If you have a forging problem — large or small, hot or cold, ferrous or non-ferrous — let us help you solve it. Send us your prints and sample parts, or better yet, visit us. No obligation.

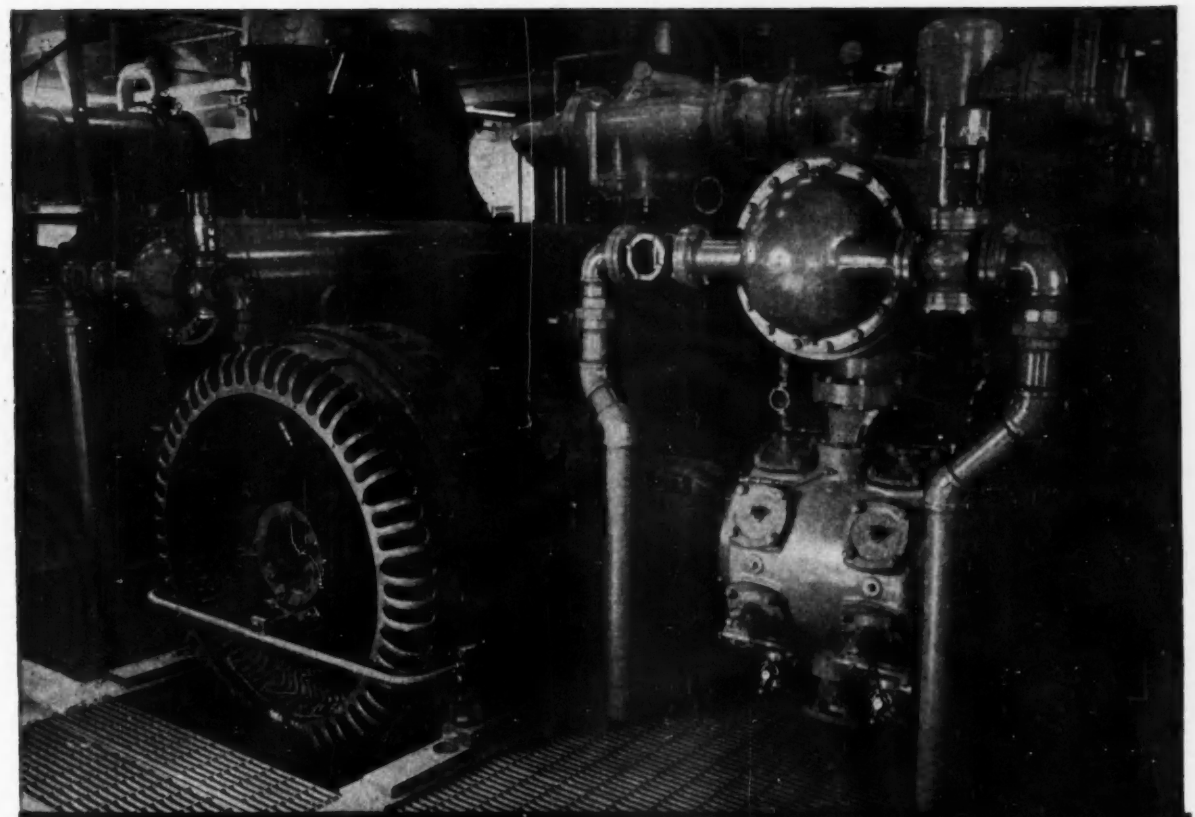


MAXIPRESSES are available in 13 sizes from 300 to 8,000 tons.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO—SINCE 1874

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS • BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS

Hartford Detroit Chicago



CLARK BALANCED/OPPOSED COMPRESSOR

Used for testing jet components in Bendix Aviation's new research center

Speeds up to supersonic levels! Atmospheric conditions ranging from sea level to 80,000 feet! Temperatures from minus 100° F. to plus 800° F. These are the conditions at which Bendix Aviation Corporation's new research facility at Teterboro, N. J. can test component equipment for jet aircraft and missiles.

Destined to save thousands of man-hours of engineering research, the new facility utilizes the latest combinations of pneumatic and electrical equipment. Playing an important part is a Clark 600 horsepower CMA-6, Motor Driven, Balanced/Opposed Compressor which supplies air at 200 psi for test purposes.

Because of the nature of the operation, perfect balance and accurate match of supply to demand, through flexible compressor cylinder loading, were important considerations in the selection of a Clark unit. Compactness saved considerable floor area.

A complete Clark line of Balanced/Opposed Compressors in the 150 to 4500 horsepower range is available in various cylinder arrangements to meet practically any requirement. A Clark representative will gladly furnish complete details. Write for Bulletin 118.

CLARK BROS. CO. · OLEAN, N. Y.

ONE OF THE DRESSER INDUSTRIES

Sales Offices in Principal Cities Throughout the World

PRECISION BY THE TON

CLARK

compressors

If You Need

SMALL PARTS IN A HURRY

plus sound engineering service

YOU CAN'T BEAT GARRETT!

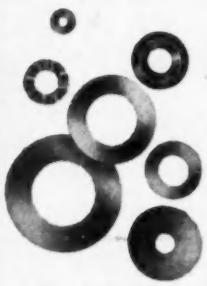


SPRING LOCK WASHERS



Garrett Controlled Tension spring lock washers assure greater holding power, longer life of every assembly. Garrett makes a complete line of lock washers to ASA and SAE specifications, plus many special types . . . in all metals and plated to your requirements.

FLAT WASHERS



Garrett gives you fast delivery from stock on the largest line of flat washers available. Precision-made in thousands of different sizes and types—standards and specials. Also made to your exact specifications to meet the individual needs of your product.

HOSE CLAMPS



AN 737 . . . stainless steel, radial type with floating bridge and thumb-screw adjustment. Approved for aircraft use.

QS-100 & AN-748 . . . worm-type, self-locking screw. Plated to prevent corrosion. Approved by Armed Forces.

AUTO-SEAL . . . screw-type adjustment, scarfed tongue prevents pinching. Staked bolt and captive nut. Rustproofed.

STAMPINGS



Quick deliveries on small and medium stampings made to your specifications on automatic, high-speed precision presses. Finishing equipment includes tumbling, polishing, heat treating and plating.

MAIL THIS COUPON

Please send me without obligation complete data and technical details on Garrett parts.

NAME_____

COMPANY_____

ADDRESS_____

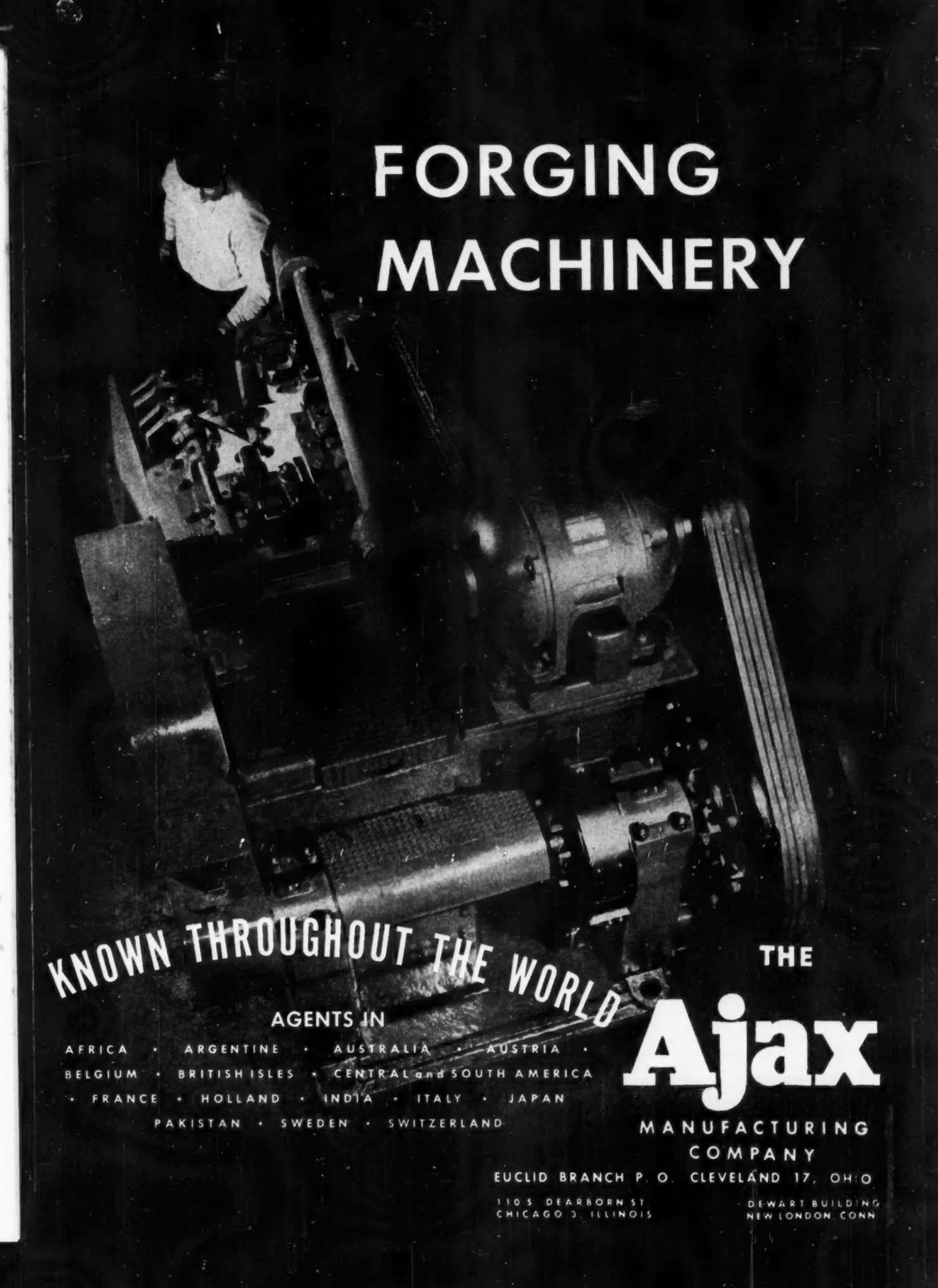
CITY_____

Manufactured by

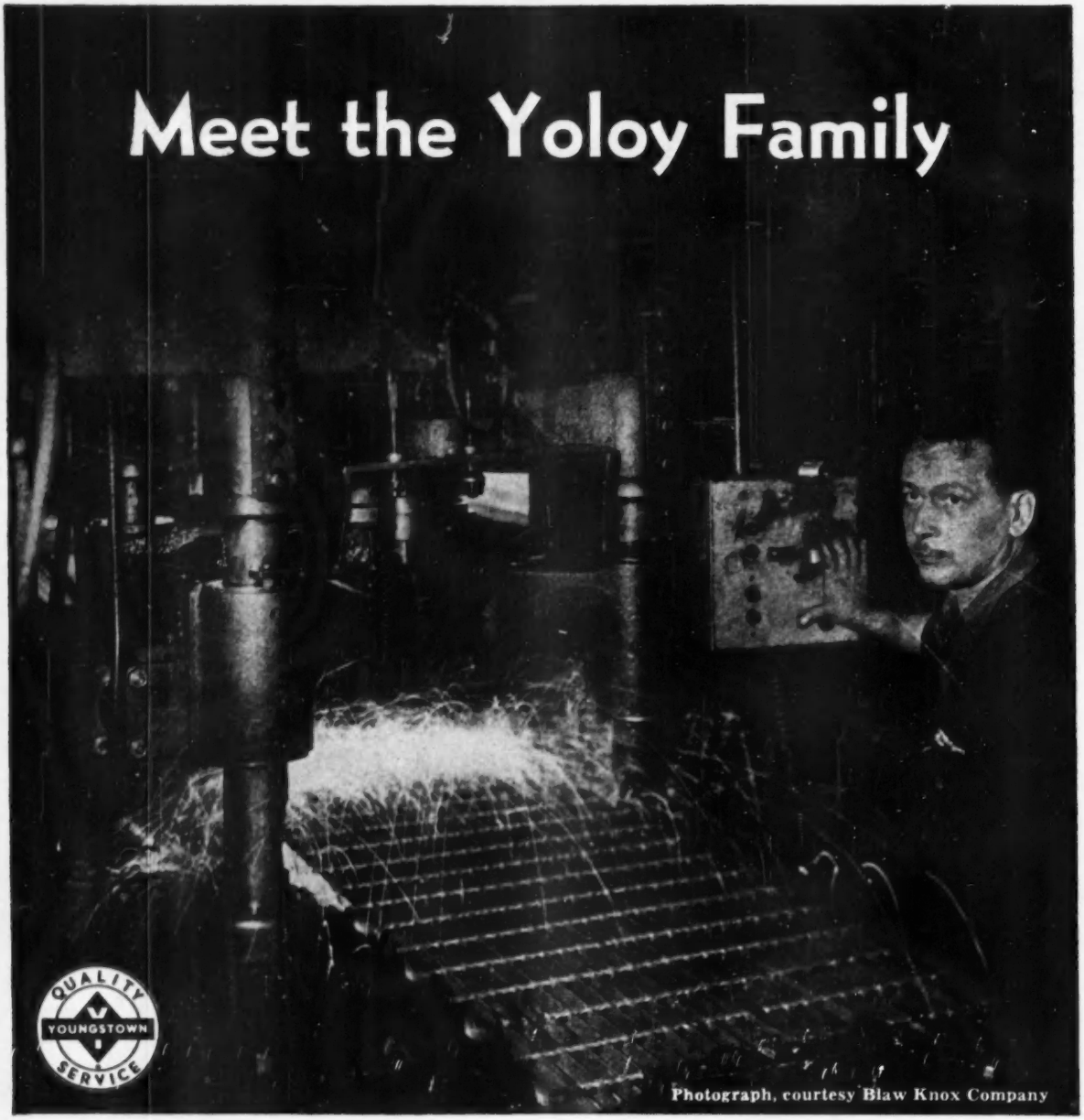
Garrett

OF PHILADELPHIA

GEORGE K. GARRETT COMPANY, INC. PHILA. 34, PA.


FORGING
MACHINERY
KNOWN THROUGHOUT THE WORLD
THE
Ajax
MANUFACTURING
COMPANY
AGENTS IN
AFRICA • ARGENTINE • AUSTRALIA • AUSTRIA •
BELGIUM • BRITISH ISLES • CENTRAL and SOUTH AMERICA
• FRANCE • HOLLAND • INDIA • ITALY • JAPAN
PAKISTAN • SWEDEN • SWITZERLAND
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
1105 DEARBORN ST
CHICAGO 3, ILLINOIS
DEWART BUILDING
NEW LONDON, CONN

Meet the Yoloy Family



Photograph, courtesy Blaw Knox Company

●The Yoloy Family of steels are available to fabricators and users who require a steel that's high in resistance to corrosion, shock, vibration and is easy to fabricate and weld. The illustration shows fabrication of "Electro-forged"* grating, using Yoloy E steels, where long life and safety require superior properties. Phone or write our nearest District Sales Office for further information.

*Registered—Blaw Knox Company

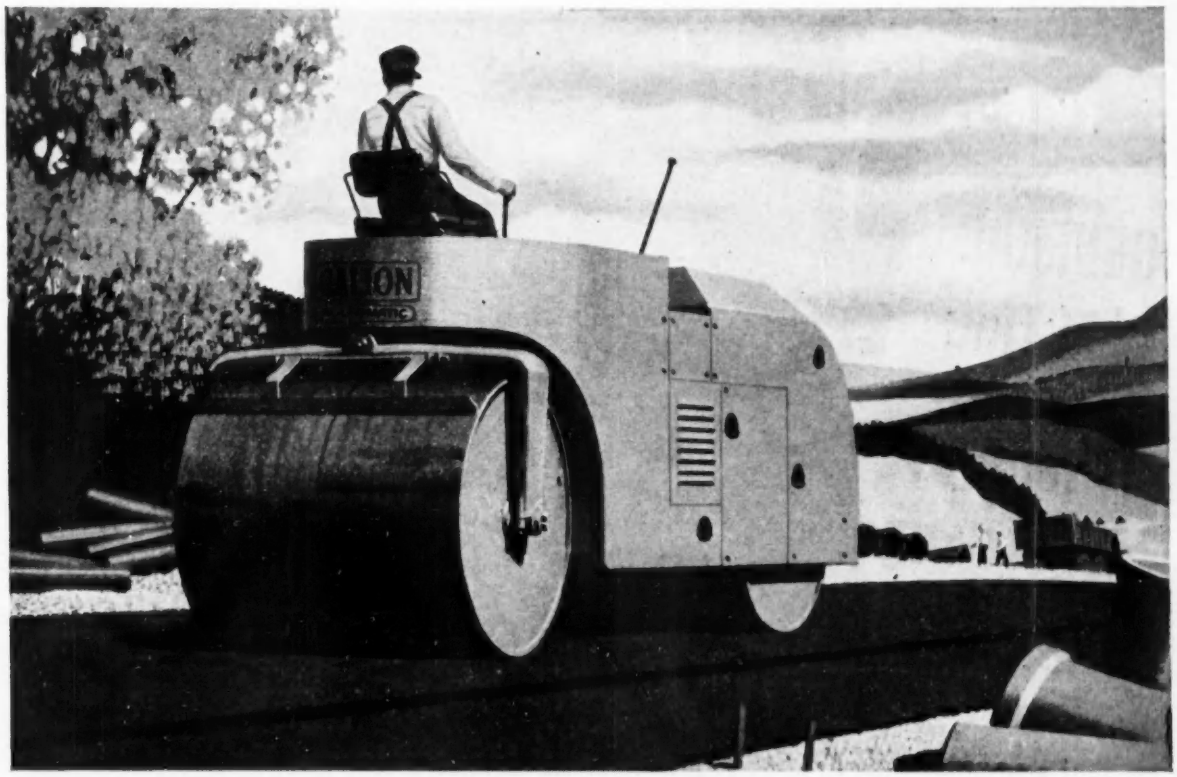
Youngstown

YOLOY *(Nickel-Copper)* Low Alloy High Strength Steel
YOLOY E *(Nickel-Chrome-Copper)* Low Alloy High Strength Steel
YOLOY C *(Chrome-Copper)* Corrosion Resistant Steel

THE YOUNGSTOWN SHEET AND TUBE COMPANY Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES



NEW GALION ROLL-O-MATIC WITH TORQMATIC CONVERTER

rolls 10% more surface per day

GALION — one of the world's largest manufacturers of road rollers—now offers four new gasoline-powered ROLL-O-MATIC tandem rollers equipped with Allison TORQMATIC Converters.

This efficient combination torque converter and fluid coupling makes ROLL-O-MATIC simpler to operate. It eliminates the master clutch. There are no gears to shift.

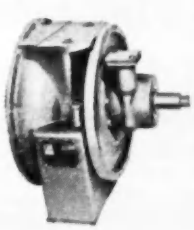
ROLL-O-MATIC rolls smoother in either direction. With the governor directly on the tailshaft it has quicker pickup —takes guesswork out of reversing. Rolling speed is automatically maintained up hill—on the level—down hill and on curves, by means of the combination of the TORQMATIC Converter and tailshaft governor.

The maker reports the operation is so smooth that at least 10% more surface can be rolled per day. And fuel consumption is reduced as much as 25%.

The applications of Allison TORQMATIC Converters are broadening rapidly. With units in a new range from 40 to 150 horsepower to fit both gasoline- or Diesel-powered engines, more than likely you, too, can gain the many moneysaving benefits of this drive. The completely *self-contained* converters are compact, easy to install and surprisingly low in price.

Check your equipment manufacturer or dealer or write us for full particulars.

ALLISON DIVISION OF GENERAL MOTORS
Box 894A, Indianapolis 6, Indiana

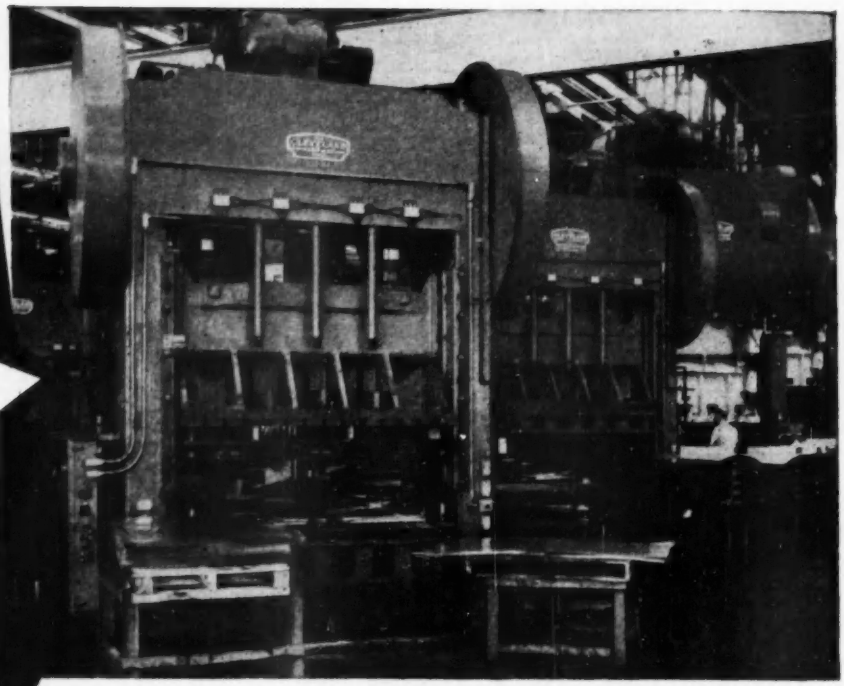


GM GENERAL MOTORS

Allison

TORQMATIC DRIVES

GENERAL ELECTRIC selects 11 MORE CLEVELAND PRESSES



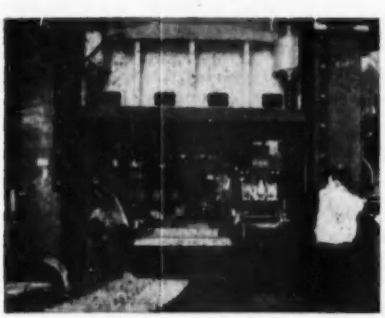
Photos courtesy General Electric Company.

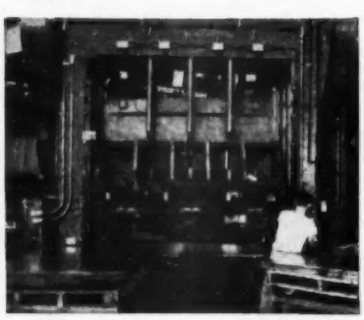
Last year 15 new Cleveland Presses were installed at Appliance Park, Louisville, Kentucky, General Electric's new major appliance center. These presses produce parts for the famous General Electric ranges.

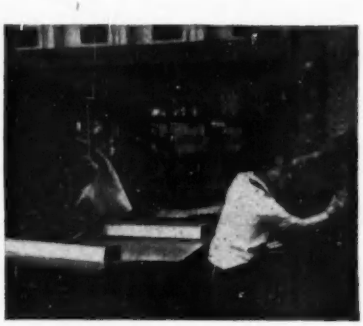
Now 11 more Cleveland Presses, equipped with the (patented) Cleveland Drum Type Clutch, are working in General Electric's Home Laundry Equipment Department.

Throughout industry, both operators and management have come to respect the dependable accuracy and ease of control designed into rugged Cleveland Presses. Production records indicate that the new Cleveland Clutch gives faster, more accurate control. Maintenance records show that this friction clutch requires only minor, easy-to-make adjustments.

You, too, can benefit by installing new Clevelands in your press production line. Let a Cleveland engineer help you select the exact Cleveland Press for utmost efficiency. Write or call today! A-9759







THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES — FABRICATING TOOLS

E. 40th & St. Clair Avenue, Cleveland 14, Ohio

Offices at: NEW YORK • CHICAGO • DETROIT
PHILADELPHIA • E. LANSING • OXFORD, O.

CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT

WHY IT PAYS TO BUY MX SCREW STOCK FROM US



You get reduced production costs—quick delivery

● Hundreds of shop cases have shown that USS "MX" free-machining bar stock cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. And the more machine work your parts require, the greater the savings.

Here's how you cut costs when you use "MX" rather than other free-machining grades:

You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer rejects, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U.S. Steel Supply warehouse.

In addition to "MX" stock, we carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades.

TRIPLE SECURITY

What you want
When you want it
At the right price

U. S. STEEL SUPPLY

DIVISION

General Offices
208 So. La Salle St., Chicago 4, Ill.

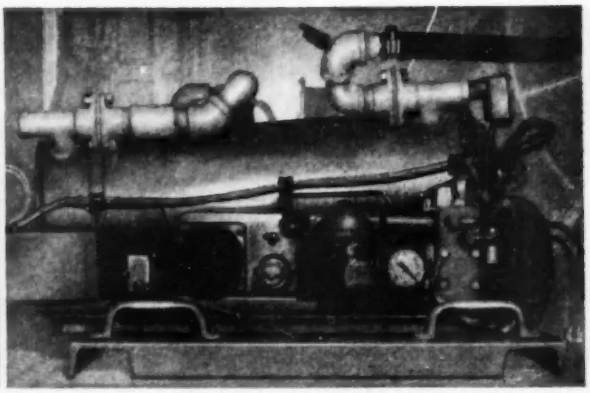
USS

Warehouses and Sales Offices
Coast to Coast

USS STEEL
UNITED STATES STEEL

UNITED STATES STEEL





TYPE 0-6 CRASH TRUCK plus JANITROL LIQUID HEATER equals

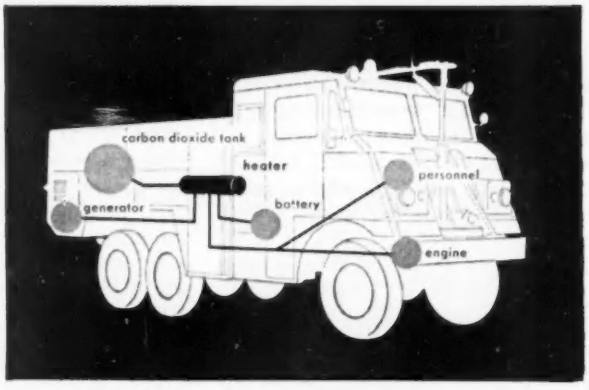
WINTERIZATION TO 65° BELOW ZERO

It takes just fifteen minutes for two men to install and connect, or disconnect and remove the Janitrol Liquid Heater equipped "winterization kit" in the Air Forces new Type 0-6 Cardox Crash Truck.

Cardox engineers took full advantage of Janitrol unit design accessibility . . . added a coolant pump, hand bypass pump, electrical over-ride connections, and an aluminum channel-iron skid base to come up with the ultimate in changeover speed. Just six quick-disconnect couplings tie coolant flow—electric supply—and fuel supply to the permanently installed winterization system within the truck. Operating controls are installed in the truck cab.

The Janitrol heater provides 90,000 Btu/hr for engine block, engine pan, battery box, radiator, cab and body, defrosting, a motor generator set, and the Cardox pressure vessel heating. Complete insurance against winter operating failures caused by freeze-ups!

Look into Janitrol Liquid Heaters' long record of dependability under all conditions—and you'll specify "Janitrol" for vehicle heat wherever and whenever needed.





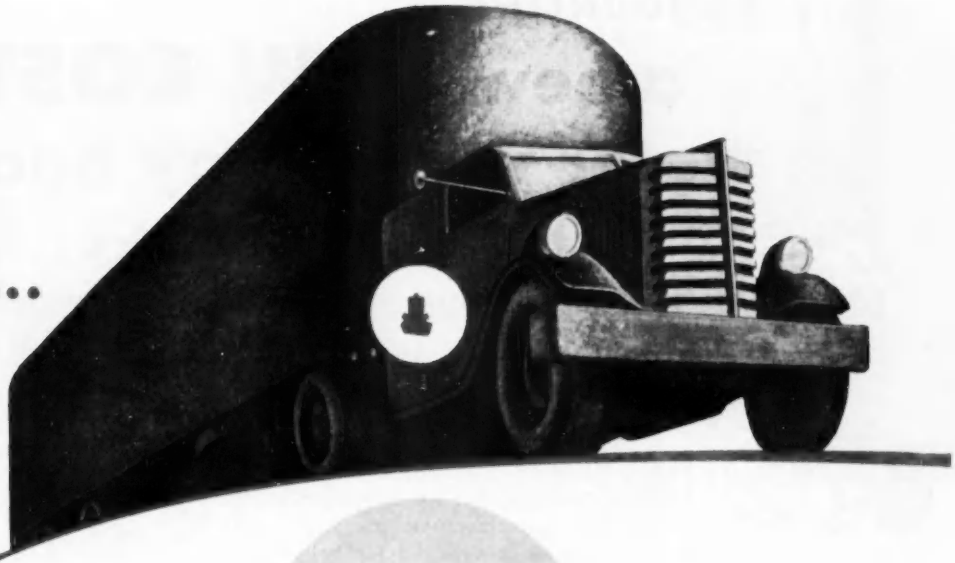
HEAT WHEREVER YOU WANT IT

Janitrol

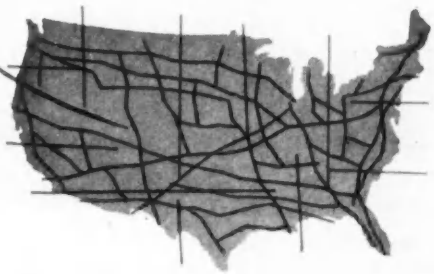
AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORP., COLUMBUS 16, OHIO

DISTRICT ENGINEERING OFFICES: NEW YORK, 225 BROADWAY; WASHINGTON, D. C., 4650 EAST-WEST HIGHWAY; KANSAS CITY, 2201 GRAND AVE.; FORT WORTH, 2509 BERRY ST.; HOLLYWOOD, CALIF., 7046 HOLLYWOOD BLVD.; COLUMBUS, OHIO, 400 DUBLIN AVE.

IN DUAL FUEL SYSTEMS...



a little control  goes a long way



Millions of trouble-free highway miles over rugged terrain, in all kinds of weather—subject to all the vibration, shock and temperatures you'd expect in a heavy-duty tractor and trailer haul . . . that's the performance record racked up by General Controls PV Series gasoline and LP gas shut-off valves . . . and they can take it. These valves were originally designed to stand up under the impact of Hi-G stresses—so they offer a bonus margin of safety factors far beyond the usual field requirements.

Continuous duty solenoids, soft-seated valves, and other high performance features assure faultless operation at 10 psi for gasoline and 300 psi for LP gas.

Normally closed. Perfect operation in any position.

When *you* convert be safe . . . be efficient . . . be economical . . . be *sure* with dependable General Controls valves.

General Controls

hi-g

Controls

GENERAL CONTROLS

Glendale, Calif., Burbank, Calif., Skokie, Ill.

Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls for Heating, Home Appliances, Refrigeration, Industrial and Aircraft Applications.

FACTORY BRANCHES IN 38 PRINCIPAL CITIES
See your classified telephone directory

ANNOUNCING . . .

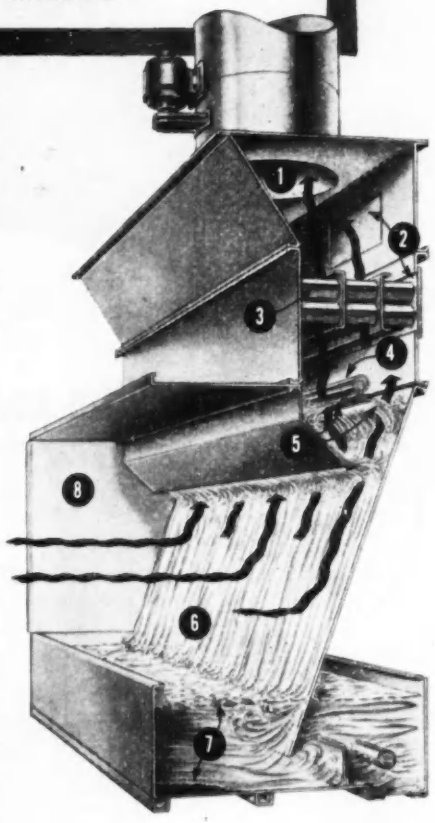
a new LOW COST water wash spray booth

—by **Binks**



Ideal for use in most plants

This new low-cost Style D water wash spray booth is recommended for normal industrial production. It supplements the Style DUC booth which is unequalled for heavy production and hard-to-handle paints. But the powerful double washing action of this new booth makes it ideal and fully approved for the big majority of spray painting installations.



✓Check these 9 money-saving features:

1. **Fan stays cleaner longer.** Virtually all pigment is removed from exhaust air.
2. **Easy access.** Fan and arrestor plates are reached through doors in back of booth. When booth is installed against a wall, access doors are placed in front and lower section of water curtain is easily removed.
3. **No moisture reaches stacks.** Arrestors trap moisture.
4. **Unbroken water curtain.** Binks special clog-proof Dynaprecipator manifold distributes water uniformly.
5. **Double washing.** Paint fumes and overspray must pass through 2 washings before they leave the booth.
6. **Stays clean longer.** The water curtain is constantly flushed.
7. **Overspray reclaimed.** Overspray is washed into the water pan where it is trapped for easy removal or reclamation. This minimizes paint sludge reaching the circulating pump.
8. **Rigid, long-life construction.** Engineered to give long, trouble-free service.
9. **Economical.** Costs less, uses less electricity, occupies less floor space, requires less maintenance.

LET US ANALYZE YOUR NEEDS

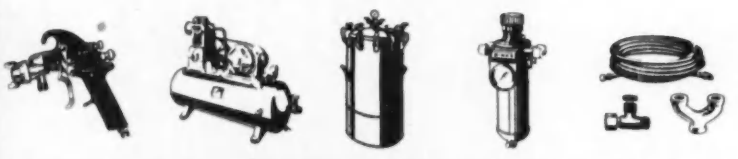
Without obligation a Binks engineer will gladly call at your office to discuss the advantages of this new booth or to help you with spray painting problems of any kind. Just contact your nearest Binks office or write directly to the address below.

ASK ABOUT OUR SCHOOL. A week of training in best finishing methods, equipment selection and maintenance. No charge for tuition. All welcome. Write for class dates and curriculum.

BINKS MANUFACTURING COMPANY 3120-30 Carroll Ave., West, Chicago 12, Illinois

Binks

EVERYTHING FOR SPRAY PAINTING



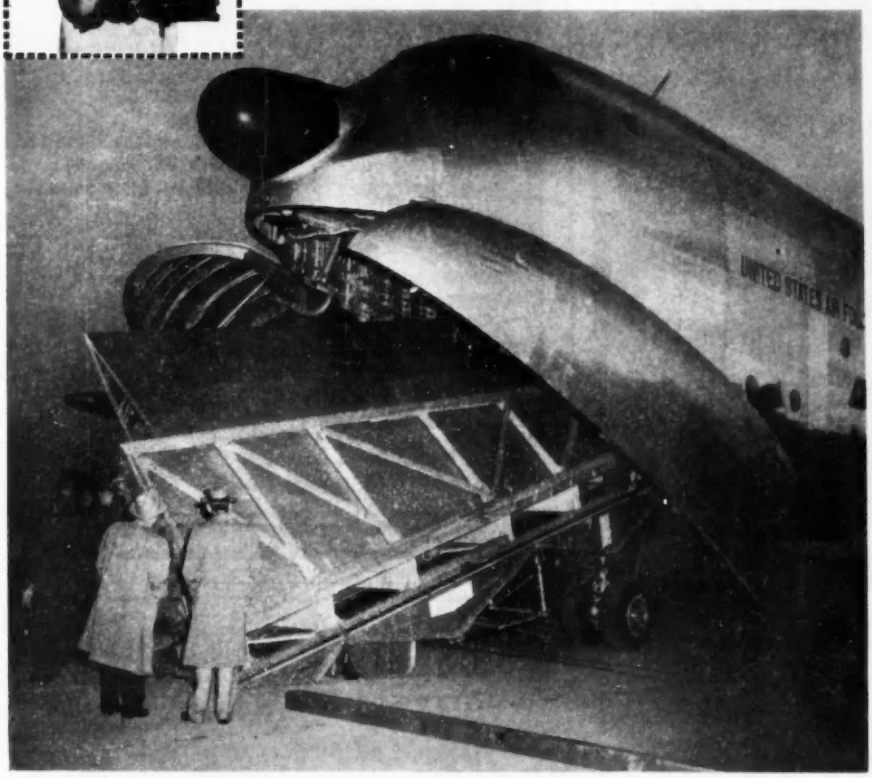
GUNS • COMPRESSORS • FLUID TANKS • EXTRACTORS • ACCESSORIES

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY



Here right now...

This small gas turbine is a proven, working reality!



When it's loading time, and in emergencies, the giant Douglas C-124C, world's largest cargo plane, is vitally dependent on the Solar "Mars" gas turbine. This light weight engine drives the auxiliary generator providing power for cargo winches, doors, ramps, lights, engine starters and other equipment whenever the main engine generators are not operating.

The Solar "Mars" Gas Turbine

THE SOLAR "MARS" small gas turbine engine has proven its worth in standard operations, hour after hour. It has demonstrated rugged reliability by its trouble-free performance in airborne auxiliary generator sets.

The basic facts about this practical small gas turbine are its light weight (less than 100 lb); its size (smaller than a two-foot cube); its power output (approximately 50 hp); its simplicity, versatility.

The Solar "Mars" is powering generators on the Douglas C-124C Globemaster, and it will soon be standard equipment on the Lockheed C-121C Super Constellation. It is also used to power portable fire fighting pumps and is under test for many other applications. Solar has also developed a 500 hp gas turbine, the "Jupiter," that is now being field tested for military and industrial uses.

Both the "Mars" and "Jupiter" have proved the theoretical advantages of gas turbines. Two great new small prime movers have been born.

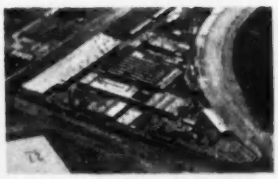
Today most Solar gas turbines are being delivered to military users, but soon they will be available to civilian industry.

SOLAR AIRCRAFT COMPANY — SAN DIEGO, DES MOINES

DESIGNERS, DEVELOPERS AND MANUFACTURERS OF METAL ALLOY PRODUCTS

This is What Solar Offers You

Solar specializes in the manufacture of precision products from alloys and special metals for severe service. Solar's experience since 1927 is unduplicated in this field. Solar skills and facilities range from research, design and development through to mass production. Wherever heat, corrosion or difficult specifications are problems, Solar can help solve them.



PLANTS. *In San Diego (photo above) and Des Moines. A total of 1,400,000 sq. ft. of floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

EQUIPMENT. *Production equipment for all types of metal fabrication—forming, machining, welding, brazing, casting, coating. Extensive laboratory and testing equipment. Facilities for development, prototype, limited or mass production.*

SERVICES. *Research, design, development, tooling and production engineering staffs. Experienced with all alloy steels, stainless alloys, super alloys, and titanium and its alloys. Government source inspection and Solar quality control meet rigid aircraft and commercial standards.*

CONTRACT PRODUCTION

Current orders include aircraft engine and airframe parts, alloy castings, pneumatic ducting, atomic energy components. Customers include some of the most honored names among aircraft and industrial companies in U. S. and Europe.

SPECIAL PRODUCTS



Bellows. *"Sola-Flex"® bellows and expansion joints in many designs from ½ in. up to the world's largest, 28 ft in diameter.*

Gas Turbines. *Solar "Mars" 50 hp unit for auxiliary generator sets, ground carts, portable fire pumps; Solar "Jupiter" 500 hp engines in variable and constant speed models.*

Ceramic Coatings. *"Solaramic"® is the Solar trade mark for a family of coatings that protects metals from heat, corrosion, galling and abrasion.*

Controls. *Complete control systems utilizing the new Solar "Microjet"® principle for control of gas turbines, jet engines and pneumatic devices.*

FURTHER INFORMATION
Your inquiry regarding any Solar service or facility will receive prompt attention. Address Solar Aircraft Company, Department A-21, San Diego 12, California.

Saved at Ford Aircraft Engine Division: 4 Dispatchers, 600 Daily 'Phone Calls *by using*

TelAutograph*

Instan-Form* TELESCRIBERS!

"Handwritten communications system"



Concise, pre-printed request forms used in "Instan-Form" telescribers are designed to Ford's specifications to take the place of old maintenance forms.

Currently producing J-57 turbo-jet engines, Ford Motor Company's Aircraft Engine Division in Chicago uses TelAutograph Telescriber Systems for maintenance control to provide greater speed and efficiency in handling work requested.

Requests are now telescribed to the proper maintenance departments *instantly, simultaneously and in writing* directly from their maintenance control department.

Results:

1. Saving of 4 dispatchers needed to handle telephone transmissions.
2. Delays of 5 to 30 minutes eliminated.
3. Provides method in pinpointing downtime.
4. Tremendous savings through reduced downtime.
5. Approximately 600 'phone calls eliminated each day
6. Elimination of costly verbal misunderstandings.
7. Saving of personnel trips to control department.

*TM Reg. U. S. Pat. Off.

TelAutograph CORPORATION

Dept. AI-49 16 West 61st Street, New York 23, N. Y.

Please send me the full story of maintenance control with a TelAutograph Telescriber System.

Name_____

Street_____

City_____ State_____

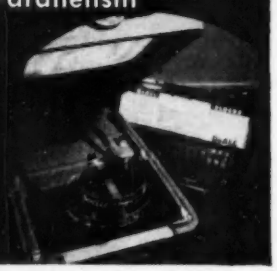
Company_____

DoALL OPTICAL FLATS

For Checking Flatness, Size and Parallelism

A size and type for every job!

- Purest Quartz
- Accuracies to .000001"
- Diameters to 10"
- Special sizes, shapes made to order

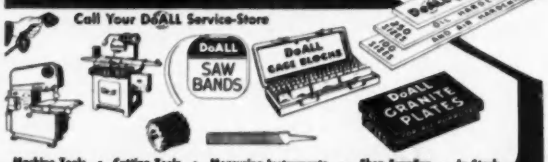


Ask about DoALL Monolights—2", 5", 20" sizes

Consult your classified phone directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.



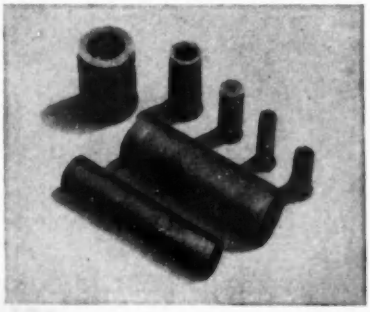
Call Your DoALL Service-Store



Machine Tools • Cutting Tools • Measuring Instruments • Shop Supplies • In Stock

The DoALL Company, Des Plaines, Ill. 14

WHAT JOBS HAVE YOU for...



PRECISION MACHINE WORK — NON-GRAN — CASTINGS • SAND & CENTRIFUGAL

Spun CENTRIFUGAL CASTINGS

Non-Gran Spun Centrifugal cast process gives an exceptionally high strength, pressure dense casting, ideally suited for aircraft engine service. We are supplying such castings to an ever increasing list of manufacturers in any of the bronze alloys, rough or machined.

Write today for descriptive literature

AMERICAN NON-GRAN BRONZE CO.

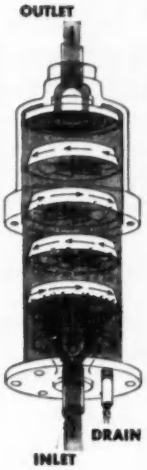
BERWYN, PENNA. *(Metropolitan Phila.)*

EQUIPMENT LASTS LONGER
...PERFORMS BETTER...
when the

ARIDIFIER

SCRUBS, CLEANS AND DRIES
On Air and Gas Lines



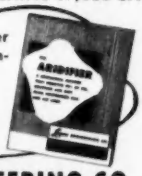


LASTS LONGER because...
The Aridifier's patented centrifugal-baffle action traps 92% of all dirt, oil, scale and water in gas or compressed air . . . and drains off these troublemakers *before* they can damage tools and equipment.

PERFORMS BETTER because...
The Aridifier protects tools against the freezing, fouling, caking and corrosion caused by dirt and foreign matter . . . assures the clean, dry air and gas that means better spray work, painting, lacquering, sand blasting, air cleaning, and similar operations.

Easily installed, the Aridifier maintains itself. 10 models. Capacity range; 7 CFM to 17,000 CFM.

Learn HOW the Aridifier scrubs with a patented centrifugal-baffle action.
Write for This Catalog Now!



Logan ENGINEERING CO.
4909 W. Lawrence Ave., Chicago 30, Ill.

BRAND NEW
VERTICAL-HORIZONTAL-BASE
DE-STA-CO TOGGLE CLAMP



with low silhouette
the fixture-hugger that makes it far easier to insert and remove work . . .

and complete clearance
of working area due to flap-over holding bar—ideal for positioning metal or plastic sheets!



Send for FREE CATALOG
on the new DE-STA-CO Models 507 and 509

DE-STA-CO DETROIT STAMPING COMPANY
World's FIRST Line of TOGGLE CLAMPS
297 Midland Avenue • Detroit 3, Michigan

the Way to improve an AUTOMOTIVE PRODUCT is often...

a little Different set screw

Manufacturers of cars . . . trucks . . . tractors . . . aircraft . . . and automotive equipment and parts, form an important part of the more than 1500 plants using billions of Setko Set Screws during the past 19 years. You also, may find that the solution to your problem is the use of a slightly different, special set screw that resists vibration, provides extra holding power or closer precision setting, or helps cut down costs. Perhaps you are looking for a new source for standard set screws, offering better production and prompt delivery facilities. In any case, get in touch with set screw specialists—Set Screw & Mfg. Co. for latest bulletins on products to fit your special need. For new, complete Catalog, simply write name and address in margin of this page, tear out and mail to us today.



This New FREE Book Tells you why over 1500 Leading Manufacturers rely on Setko to supply Improved and Special Types of Set Screws to solve puzzling problems

Set Screw & Mfg. Co.
16 Main Street, Bartlett, Illinois • Suburb of Chicago
We specialize in solving Puzzling Set Screw Problems

A few of the famous users of Setko Set Screws



7544P

3-D MAGNIFICATION

For Inspection and Small Assembly Work

with Bausch & Lomb Stereomicroscopes

Three dimensional vision

Unreversed image

Speeds work

Requires less skill



Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.

Makes little parts look big!

Call your DoALL Service-Store



The DoALL Company, Des Plaines, Ill. 12



Get This Informative Free Booklet on New Uses for Straits Tin

New, 20-page booklet tells important story of Straits Tin and its many new uses today. Fully illustrated. Includes sections on new tin alloys, new tin solders, new tin chemicals. Covers tin resources and supply, Malayan mining. Booklet is factual, informative—could well prove profitable to you. Mail coupon now.

THE MALAYAN TIN BUREAU

Dept. P, 1028 Connecticut Ave., Washington 6, D.C.

Please send me a copy of your free booklet on new uses for Straits Tin.

Name_____

Firm Name_____

Street_____

City_____ Zone_____ State_____

AUTOMOTIVE INDUSTRIES Goes into Leading Plants in the Automotive and Aircraft Industries

Thousands
of users know
FITZGERALD
Metallic Aluminum-
Fused-Oxide Steel Asbestos
GASKETS
end costly
gasket failures

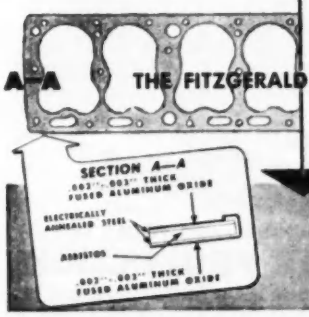
Specially designed, ruggedly built, to give a lasting, perfect seal in high compression engines, gasoline or diesel.

There's a Fitzgerald Gasket for Every Engine

Grease Retainers

Cork Gaskets

FITZ-Rite Treated Fiber Gaskets for oil, gasoline and water connections



A—A THE FITZGERALD MANUFACTURING CO.
Torrington, Connecticut

FITZGERALD *gaskets*
SINCE 1906

Over 85% of the torque wrenches used in industry are

STURTEVANT
TORQUE WRENCHES
Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams
...inch ounces
...inch pounds
...foot pounds



Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Which of these jobs gives you trouble?

Oakite has 5 new ways to help you

Oakite chemists have developed efficient new materials for the 5 important jobs listed below. One of these new materials may provide the perfect solution for your most difficult problem.

1 **HEAVY-DUTY CLEANING IN TANKS:** New material combines the best qualities of alkaline and solvent cleaners.

2 **PHOSPHATE COATINGS:** One material cleans steel while applying dense iron-phosphate coating. Another surpasses government specifications for heavy zinc-phosphate coatings. Lasting paint adhesion, protection against corrosion, ease of control.

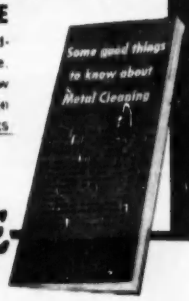
3 **ETCH-CLEANING ALUMINUM:** Uniform etching in preparation for anodizing or painting. Scaling and sludging minimized or eliminated.

4 **ELECTROCLEANING BRASS:** Efficient, economical cleaning without danger of tarnish.

5 **INHIBITING PICKLE BATHS:** Liquid inhibitor for sulphuric, hydrochloric and phosphoric acids. Saves steel, saves acid, builds own foam blanket to suppress pickling fumes. Easy to add to continuous strip or batch pickling operations.

FREE

Circle the coupon number corresponding to the job that gives you trouble. We'll send information about the new material for the work, also our 44-page illustrated booklet "Some good things to know about Metal Cleaning."



SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS · METHODS · SERVICE

OAKITE PRODUCTS, INC.,
28A Rector St., New York 6, N. Y.

Send me a FREE copy of "Some good things to know about Metal Cleaning" and tell me more about the new Oakite material for the job (jobs) corresponding to the number (numbers) I've circled below.

1 2 3 4 5

Name_____

Company_____

Address_____

Quantity
PRODUCTION
of
GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

DYKEM
STEEL BLUE
Stops Losses
making Dies and Templates



Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2301L North 11th St. • St. Louis 6, Mo.



CUT SCRAPER TIME
END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2301L NORTH 11TH ST., ST. LOUIS 6, MO.

FELLOWS
Fellows
MACHINES AND TOOLS FOR
GEAR PRODUCTION
The Fellows Gear Shaper Company, Springfield, Vt.

CHICAGO PRESSES

Straight Side — Double Crank
All-Welded Steel Construction



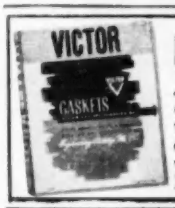
CAPACITIES 50 to 400 tons
LENGTHS 4 to 16 feet

4912

DREIS & KRUMP
MANUFACTURING COMPANY
7420 S. Loomis Blvd., Chicago 36, Illinois
CHICAGO

X-L Brand
HYDRAULIC PACKINGS
AND
MECHANICAL LEATHERS

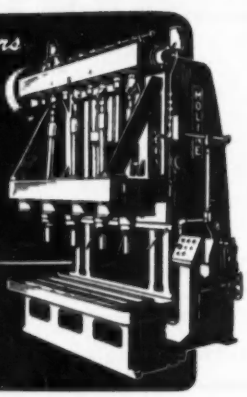
EXCELSIOR LEATHER WASHER MFG. CO., ROCKFORD, ILLINOIS



FREE Gasket Engineering Guide

. . . this useful engineering guide to gasket designs and packing materials for automotive and aviation applications. World's most complete line. Ask for catalog 505. Please write on your business letterhead. Victor Mfg. & Gasket Co., P. O. Box 1333, Chicago 90.

MOLINE
For Over 50 Years
"HOLE-HOG"
Specially Designed
MACHINE TOOLS
Have Cut Production Costs for American Industry



MOLINE TOOL CO.

No. HU68 — Hydraulic rail feed universal joint type multiple spindle drilling machine

TRACK SUPPLIES · STRUCTURAL STEEL · RAILS

RAILS *New and Relaying!*
TRACK MATERIALS
AND ACCESSORIES CARRIED IN STOCK
Switch Material • Spikes and Bolts • Track Tools • Ties • Tie Plates • Bumpers • Complete Side Tracks

BUILDERS STEEL SUPPLY CO.
4201 WYOMING • P.O. BOX 188 • DEARBORN, MICH.
SEND US YOUR ENQUIRIES

AUTOMOTIVE INDUSTRIES
Readers
are always well
Informed.

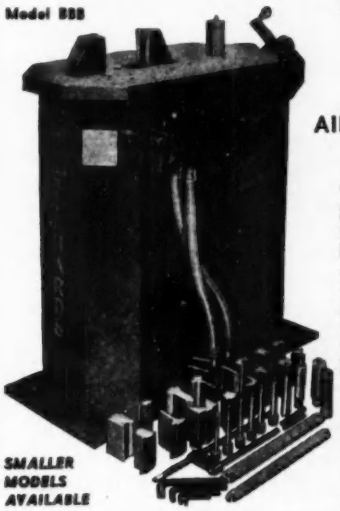
Multiform

BIG BROTHER BENDER



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender.

Model BBB



SMALLER MODELS AVAILABLE

AIR OPERATED MODELS IN FOUR SIZES

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches — punching and blanking dies extra. Will punch holes up to 1" and form material up to ¼" thick by 4" wide. We also build smaller models, hand or air operated, for bending materials up to ⅛" x 1½".

Send for illustrated folder AMI-2

J. A. RICHARDS CO. 903 North Pitcher St. Kalamazoo, Mich.

DoALL 20" MONOLIGHT

lets you inspect flatness of large surface areas or groups of parts

- Checks flatness in millionths
- 30" x 30" work area
- 20 foot-candle intensity
- Mercury light

Consult your yellow Directory for location of nearest of the thirty-eight DoALL Sales-Service Stores that stock complete metal working necessities.





The DoALL Company, Des Plaines, Ill.

Insist on VELLUMOID!

DON'T TAKE CHANCES!

The best overhaul job can be ruined by a defective gasket. Always use VELLUMOID on all oil, water and gasoline connections to insure your good work.

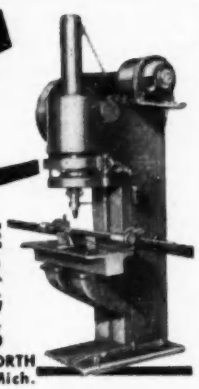
1/16 1/32 1/64

THE VELLUMOID COMPANY

YOU'LL GET MORE PARTS PER HOUR with a...

General

FLEXIBLE POWER STRAIGHTENING PRESS



General Manufacturing Co. 6439 FARNSWORTH DETROIT 11, Mich.

THE CLAMP HOUSE **CENTRAL** THE CLAMP HOUSE

Manufacturers of a Full Line of Hose Clamps

1—"ALLSIZE"—100% UNIVERSAL—BAND CLAMP—FITS ANY SIZE HOSE—⅝" I.D. AND UP.
2—"360" NEW, POWERFUL DOUBLE STRAND WIRE HOSE CLAMP—WITH THE "PUSH-PULL" ACTION.
3—"WORM-GEAR"—THE BEST GEARED CLAMP MADE—PROVIDES GREAT POWER AND EXTRA TAKEUP.
4—"TWO-PIECE"—EXTRA STRONG—INEXPENSIVE—BAND TYPE—VIBRATION PROOF HOSE CLAMP.

Tell Us Your Clamp Problems! We Will Send Samples, Without Charge, of the Type and Size Hose Clamp You Need.

Address Dept. A

CENTRAL EQUIPMENT CO., 1112 So. Wabash Ave., Chicago 5

Index to Advertisers

This Advertisers' Index is published as a convenience, and not as part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert

A

AC Spark Plug Div. 127
Acadia Div. Western Felt Works..... 10
Accurate Bushing Co. 122
Aeroquip Corp. 191
Aetna Ball & Roller Bearing Co..... 101
Airtex Products, Inc. 124
Ajax Manufacturing Co. 237
Allen Mfg. Co. 117
Allis Co., Louis 213
Allison Div. G. M. 239
Allmetal Screw Products Co. 132
American Bosch Div. American Bosch Arma Corp. 28
American Chain & Cable Co. (Page Steel & Wire Div.) 194
American Chemical Paint Co. 111
American Machine & Foundry Co. ..... 3rd Cover
American Non-Gran Bronze Co..... 246
Amgears, Inc. 219
Armstrong Cork Co. 42
Aro Equipment Corp. 159
Associated Spring Corp. 47
Automatic Spring Coiling Co. 253

B

Babcock & Wilcox Co. (Tubular Products Div.) 4
Baker Bros., Inc. 197
Barber-Colman Co. 16-17
Barnes-Gibson-Raymond 47
Bendix Aviation Corp.
Eclipse Machine Div. 97
Products Div. 30
Zenith Carburetor Div. 165
Bergen Wire Rope Co. 155
Bethlehem Steel Co. 233
Binks Mfg. Co. 244
Bliss Co., E. W. 172-173
Borg & Beck Div. 138
Brainard Steel Div. 13
Brush Electronics Co. 221
Buckeye Tools Corp. 140
Builders Steel Supply Co. 250
Bundy Tubing Co. 20-21
Burton Auto Spring Corp. 204

C

Central Equipment Co. 251
Chambersburg Engineering Co. 171
Chicago Pneumatic Tool Co. 218
Chicago Rawhide Mfg. Co. 202
Chicago Rivet & Machine Co. 142
Chicago Screw Co. 154
Cincinnati Milling Machine Co. 105
Clark Bros. Co. 235
Clark Equipment Co. 149-150
Clearing Machine Corp. 145
Cleveland Punch & Shear Wks. Co..... 240
Cleveland Welding Co. 229
Cold Metal Products Co. 210
Colonial Broach Co. 201
Cone Automatic Machine Co. 12
Consolidated Engineering Corp. 230
Continental Diamond Fibre Co. 153
Continental Motors Corp. 209
Coolidge Corp. 170
Copper & Brass Research Assn..... 216-217

D

Dana Corp. 136-137
Danly Machine Specialties, Inc. 22-23
Davis & Thompson Co. 174
Detroit Stamping Co. 247
Dewey & Almy Chemical Co. 163
DoAll Co. 246-248-251
Doehler-Jarvis Div. 14-15
Dole Valve Co. 152
Donaldson Co., Inc. 180
Dow Furnace Co. 118
Dreis & Krump Mfg. Co. 250
Dunbar Bros. Co. 47
Dykem Company 250

E

Eaton Manufacturing Co. 25-76
Elastic Stop Nut Corp. 43
Elco Tool & Screw Corp. 253
Electric Auto Lite Co. 7
Electric Furnace Co. 182
Electric Storage Battery Co. 134
Excelsior Leather Washer Mfg. Co. 250

F

Fairchild Engine & Airplane Corp..... 223
Fairfield Mfg. Co. 186
Farval Corp. 78
Fasco Industries, Inc. 188
Federal Machine & Welder Co. 203
Federal-Mogul Corp. 44
Fellows Gear Shaper Co. 250
Fitzgerald Mfg. Co. 249
Foote Burt Co. 46
Formed Tubes, Inc. 196
Frenchtown Porcelain Co. 162
Frontier Bronze Corp. 222
Fuller Mfg. Co. 123

G

Garrett Co., Inc., Geo. K. 236
General Controls Co. 243
General Electric Co. 144
General Mfg. Co. 251
General Tire & Rubber Co. 113
Gibson Co., Wm. D. 47
Gisholt Machine Co. 107-108-109-110
Globe-Union, Inc. 205
Gordon Co., Claud S. 212
Great Lakes Steel 74
Gunite Foundries Corp. 193

H

Hannifin Corp. 11
Hansen Mfg. Co. 214
Harnischfeger Corp. 179
Harrison Radiator Div. 161
Harvey Aluminum Sales, Inc. 195
Heald Machine Co. ..... 2nd Cover
Henry & Wright Div. 232
Hohman Plating & Mfg., Inc. 200
Honan-Crane Corp. 207
Hyatt Bearings Div. 5
Hy-Pro Tool Co. 91

I

Inland Steel Co. 215

J

Janitrol Div. Surface Combustion Co.... 242
Johnson Products, Inc. 112
Jones & Laughlin Steel Corp. 24-227

K

Kaiser Aluminum & Chemical Sales, Inc. 231
Kent-Owens Machine Co. 115
King-Seeley Corp. 148
Korfund Co., Inc. 190

L

Lamb Electric Co. 106
LaPointe Machine Tool Co..... 128-129
Le Roi Company 169
Lindberg Industrial Corp. 26
Link Belt Co. 29
Littell Machine Co., F. J. 124
Logan Engineering Co. 247

M

McLouth Steel Corp. 147
Magnaflux Corp. 146
Malayan Tin Bureau 248
Mallory & Co., Inc., P. R. 18
Mattison Machine Works 2
Midland Steel Products Co. 104
Miehle-Dexter Supercharger Div..... 211
Miller Fluid Power Co. 73
Milwaukee Div. 47
Moline Tool Co. 250
Moraine Products Div. 175
Morse Chain Co. 183
Motch & Merryweather Machinery Co.. 8
Muskegon Piston Ring Co. 119

N

Nadella 226
National Acme Co. 103
National Broach & Machine Co. 135
National Lead Co. 14-15
National Machinery Co. 234
National Motor Bearing Co. 176-177
National Screw & Mfg. Co. 77
National Steel Corp. 74
Naugatuck Chemical Div..... 139
Northwest Chemical Co. 133

O

Oakite Products, Inc. 249
Ohio Div. 47
Olympic Metal Products, Inc. 182
Osborn Mfg. Co. 228

P

P & H Diesel Engine Div..... 179
Page Steel & Wire Div. Amer. Chain & Cable Co. 194
Palnut Co. 158
Pesco Products Div. 75
Planet Corp. 114
Purolator Products, Inc. 189

R

Ransburg Electro-Coating Corp. 130
Rathborne, Hair & Ridgway Box Co..... 116
Raymond Mfg. Co. 47
Reliance Electric & Engrg. Co. 156-157
Ren-ite Plastics, Inc. 126
Reynolds Aluminum Fabricating Service 120-121
Reynolds Wire Div. 187
Richards Co., J. A. 251
Rochester Products Div. 125
Rockford Clutch Div. 168
Ross Gear & Tool Co. 9
Ryerson & Son, Inc., Jos. T. 32

S

Sahlin Engineering Co. 181
Sanborn Co. 27
Schmieg Industries, Inc. 151
Sciaky Bros., Inc. 131
Sealed Power Corp. 95
Set Screw & Mfg. Co. 247
Solar Aircraft Co. 245
Spicer Mfg. Div. Dana Corp. 136-137
Sturtevant Co., P. A. 249
Sun Oil Co. 6
Superior Steel Corp. 143
Synchro-Start Products, Inc. 99

T

Taylor-Winfield Corp. 160
Tel Autograph Corp. 246
Temco Aircraft Corp. 225
Thompson Bremer & Co. ..... 3rd Cover
Thompson Products Co. 45-164
Timken Roller Bearing Co. ..... Back Cover
Tomkins-Johnson Co. 208
Torrington Co. 93
Townsend Co. 198-199
Tung Sol Electric, Inc. 192
Twin Disc Clutch Co. 206

U

United Specialties Co. 102
United States Rubber Co. 139-185
United States Steel Supply Div..... 241

V

Vanadium Corp. of Amer. 220
Vellumoid Co. 251
Vickers, Inc. 141
Victor Mfg. & Gasket Co. 250

W

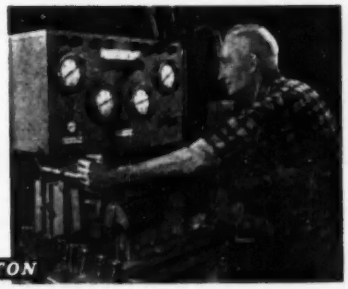
Wagner Bros., Inc. 166-167
Waterman Products Co. 178
Waukesha Motor Co. 1
Western Felt Works 10
Wheland Company 250
Whittington Pump & Engineering Corp.. 253
Wrought Washer Mfg. Co. 224

Y

Yates-American 184
Young Spring & Wire Corp., L. A..... 19
Youngstown Sheet & Tube Co. 238

Z

Zagar Tool, Inc. 212
Zollner Machine Works 254



VACUUM TESTER CHECKS VALVES AT THE

FORD MOTOR COMPANY

For years automobile manufacturers have looked for a safe, fast, accurate method of production line testing of valves for tight seating and leaks. This Whittington installation at Highland Park does the job quickly, accurately and automatically. Whittington engineers are available for consultation on any leak detecting problem.

WHITTINGTON

PUMP AND ENGINEERING CORP.
1126 PROSPECT STREET • INDIANAPOLIS, INDIANA

Call in a Spring Specialist WHILE YOU DESIGN to save TIME • COSTS • FAILURES



While your product is in the design stage, we can make available to you our 35 years of Spring Engineering and Production Experience — a safeguard for you against production and performance failures. Properly designed and conscientiously manufactured springs will decrease your production costs, raise the efficiency of your product, and increase your customer satisfaction. We have the ability and organization to deliver such quality precision mechanical springs. Call or write us for any spring requirement.

Compression, extension, torsion, double-torsion and spiral springs • "shot-peened" springs for added fatigue strength • wire shapes and spring stampings • valve springs for original equipment • turbulators

AUTOMATIC SPRING COILING CO.
4048 West Thorndale Avenue
Chicago 30, Illinois

ELCO PHILLIPS CROSS-RECESSED SCREWS



WOOD SCREWS
MACHINE SCREWS
TAPPING SCREWS
THREAD-CUTTING SCREWS
SEMS SCREWS
STOVE BOLTS

Elco Screws are Good Screws

Have You Tried ELCO for Quality, Price, and Delivery?

ELCO TOOL AND SCREW CORPORATION
1914 BROADWAY • ROCKFORD, ILLINOIS

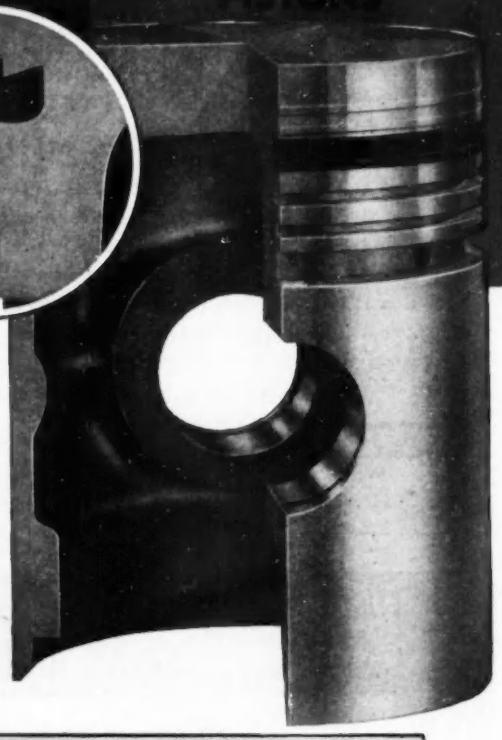
SENSATIONAL MILEAGE

STOPS! RING GROOVE WEAR

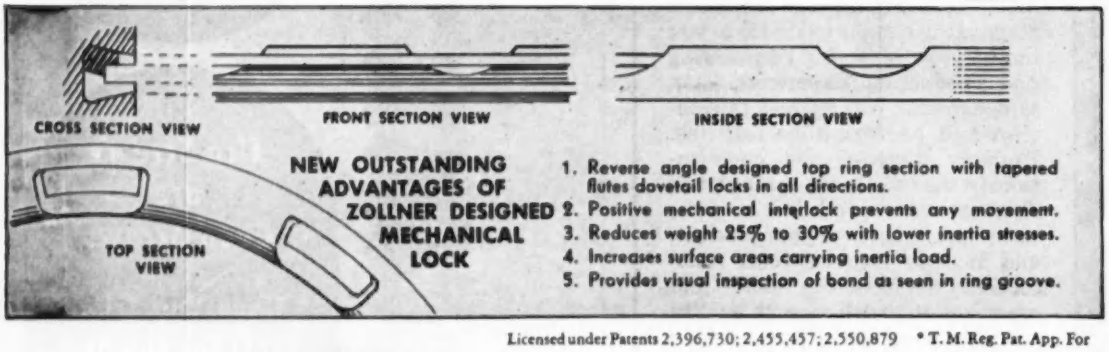
Double Bonded

METALLURGICALLY Al-Fin Bond

MECHANICALLY Zollner Lock



Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section *permanently* incorporated by *both* Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879 * T. M. Reg. Pat. App. For

- ADVANCED ENGINEERING
- PRECISION PRODUCTION

in cooperation with engine builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER MACHINE WORKS • Fort Wayne, Indiana



New time-saving AMF Everlock pre-assembled screws and lockwashers. In types, sizes and materials to meet your needs.

fasten it and forget it...

Specify Another AMF Product **Everlock** INDUSTRIAL FASTENERS

Tight, vibration-proof fastenings—*for the life of your product.*

New AMF Everlock pre-assembled screws and lockwashers give you both . . . fast, one-operation application and vibration-proof tightness. Everlock washers, with the exclusive alternating chisel edges, actually bite into the surface of both screw and part. Even under the most punishing vibration, Everlock fasteners stay secure—for *good!*

Everlock locknuts spin down finger-free. After contact with work only ¼ turn gives a sure, permanent 6-way lock. Combine unequalled speed of application with true vibration-proof performance.

On your next order for fasteners, specify AMF Everlock—and *fasten it and forget it.* Sizes, types and materials to meet any specifications.

Write for information or contact your nearest AMF Everlock Representative.

Kenneth D. DeLanoy
Dayton 3, Ohio

Oscar P. Martin
Lakewood 7, Ohio

J. Ramsey Reese, Inc.
New York 7, New York

J. M. Murphy
Manchester, Connecticut

Russell T. Brosius
Philadelphia 3, Pa.

Sam T. Keller
Detroit 1, Michigan

W. L. Barth, Jr.
Chicago 34, Illinois

C. W. McNeil
Houston, Texas

Leonard F. Berg
St. Paul 14, Minnesota

Thom Lundeen
Moline, Illinois

Forrest Maschner
St. Louis, Missouri

A. J. Murphy
DeWitt, New York

Richard C. Dudek
Beverly Hills, California

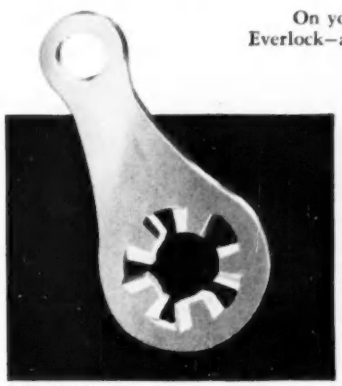
P. L. Robertson
Milton, Ontario, Canada

Sam T. Gleaves
Louisville 5, Kentucky

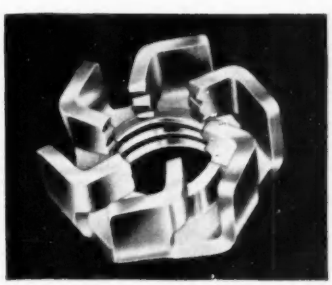
J. J. McIntosh
Atlanta 6, Georgia

Donald G. Teeling
Indianapolis 44, Ind.

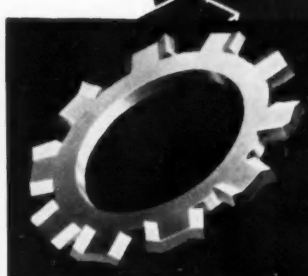
Oregon Indus. Factors
Portland 1, Oregon



TERMINALS
Plain and lock types.



LOCKNUTS
Both National fine and National coarse threads.



LOCKWASHERS
Internal, external and special types.

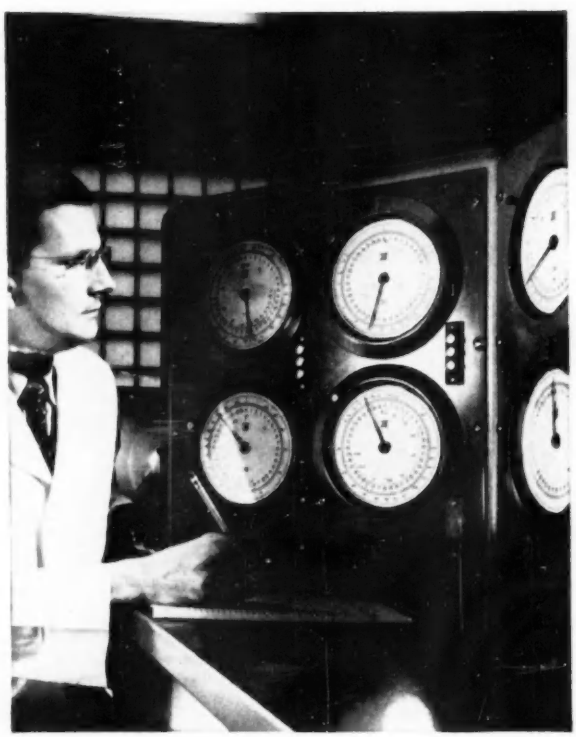
THOMPSON-BREMER & COMPANY
520 North Dearborn Street • Chicago 10, Illinois
SUBSIDIARY OF AMERICAN MACHINE & FOUNDRY CO., NEW YORK

"EVERLOCK" IS A REGISTERED TRADEMARK OF THOMPSON-BREMER & COMPANY

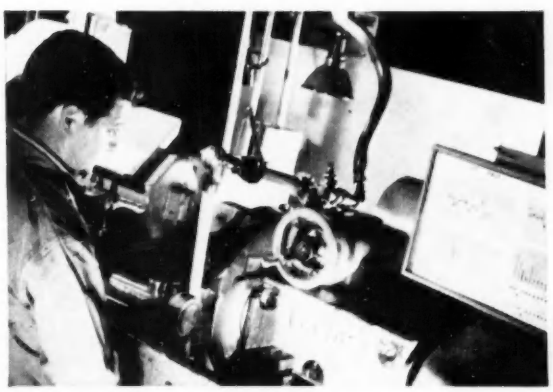
THE NUMBER 6 on the bearing cup at right, together with 5BC on the cone, tells you that this is a tapered roller bearing used on steering gears. But when the number is accompanied with the trade-mark "Timken®", it also predicts future years of trouble-free operation. Why? Because of the quality and service that go with every Timken bearing.



THE NUMBER THAT PREDICTS THE FUTURE



IN JUST 40 SECONDS this spectrometer tells the exact chemical composition of a melt of Timken bearing steel. Results are flashed back to the furnace so our melter has constant control of the chemical analysis. The Timken Company is the only U.S. bearing manufacturer that makes its own steel to control quality every step of the way.



CATCHING REJECTS before they happen is the job of our statistical quality control. For instance, a chart like this on every grinder plots the dimensions of several cups or cones from each lot. Trends towards off-size bearing parts show up instantly. This is another step we take to make Timken bearings the No. 1 value in your cars' moving parts—the vital zone.



OUR ENGINEERS WILL HELP YOU design bearing applications for your product—at no cost to you. They can often suggest improvements and more economical installation methods. This service is one more reason to always specify "Timken" with a bearing number. And for *full* value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN IS NUMBER 1 FOR VALUE WHERE VALUE COUNTS MOST — IN THE VITAL ZONE

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ↓ AND THRUST →◎← LOADS OR ANY COMBINATION ✳